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THE CHINESE BUILDING AT THE PARIS EXHIBITION.

Between the Japanese building and the Spanish is that of the Chinese exhibitors. It is a big square edifice, all black and white diaper, having a brilliant door of vermilion studded with gold, groups of sculptured figures of painted wood for its decorations, edifying Chinese inscriptions on the door posts, and unglazed windows filled with a lattice work of carved fine wood. The double crown at the summit of the building, above the door, is of black wood, and its upturned points have a startling effect. In the Chinese part of the Exhibition will be found many beautiful fabrics of silk brocade, enamel, porcelain, jewelry, and other elaborate productions of that industrious people.—*Illustrated London News.*

The Tasimeter and Magnetization.

After perusing an account, in a recent number of the SCIENTIFIC AMERICAN, of Edison's tasimeter, it occurred to one of us to apply it to detect, and, if possible, to measure, the elongation and shortening which, as discovered by Joule, are produced in a bar of iron by magnetization and demagnetization. Accordingly, to test whether the effect could be observed in this way, a rough specimen of the instrument was constructed, and with it some preliminary experiments made, an account of which may interest the readers of *Nature*. A small cylinder, about half a centimeter in length and diameter, of the carbon used for Bunsen's cells, rested with its ends, which were slightly rounded, in contact with two brass plates, one of which was fixed to a rigid upright attached to one end of the base of the instrument, while the other, resting with one end on the base, formed a spring, which in its normal position just touched the end of the carbon. A coil containing four layers of insulated wire, six turns to the layer, was wound round a tube, ten centimeters long and eight millimeters in diameter, and fixed with its axis in line with that of the carbon cylinder. A piece of iron wire was then placed in the axis of the tube, with one end resting against the spring, and the other in contact with the end of a screw working in a nut fixed to a rigid upright at the end of the base remote from the carbon. By means of this screw the pressure of the iron bar on the spring, and consequently of the spring on the carbon, could be varied at pleasure.

A terminal of copper wire was attached to each of the brass plates bearing on the carbon, and joined up so that the carbon, plates, and terminals formed one of the resistances of a Wheatstone's bridge, in connection with which a battery of one Daniell's cell and a very delicate Thomson's reflecting galvanometer were used. When the iron wire forming the core of the electro-magnet had been so adjusted that there was only a very slight pressure on the carbon, the resistances of the bridge were arranged to make the deflection of the galvanometer produced by the current from the battery nearly zero. The galvanometer and battery keys were then put down, and the current allowed to flow through the bridge during the remainder of the experiment. The electro-magnet was then excited by the current from three of Thomson's tray Daniells. This produced a deflection of the image on the galvanometer scale of about fifty divisions in the direction indicating a diminution of the carbon resistance, which must have been caused by change of contact produced by increased pressure on the spring. The length of the iron core of the electro-magnet had therefore been increased by magnetization. When the magnetizing force was removed the image immediately returned to its former position. As a verification that the diminution of resistance indicated by the bridge arrangement was caused by elongation of the iron core, the adjusting screw was turned forward through a very small distance, when the deflection was found to be in the same direction as before. When the screw was brought back the image on the scale returned towards its zero. Experiments with various strengths of current gave perfectly accordant results.

We hope by replacing the comparatively rough adjusting screw by a micrometer screw to be able to make some measurements of the exact amounts of elongation or shortening produced in a piece of soft iron or steel by given changes of magnetic intensity. It may be remarked that this method of measurement could be advantageously applied in cases where the amount of change of dimensions to be discovered or measured is very small, but the force which it could be arranged to produce abundant.—*Andrew Gray and Thomas Gray in Nature.*

University of Glasgow, July 12.

Influence of Electricity on Evaporation.

In the *Comptes Rendus* it is stated that Mascart arranged a series of small evaporating basins under conductors, which were kept in a constant electric state by a Holtz machine, moved by water power and placed under a glass case, in which the air was dried by vessels containing sulphuric acid.

The experimenter found that the evaporation was constantly increased under the electrized gratings, whether the electricity was positive or negative, evaporation being sometimes doubled.

THE PARIS EXHIBITION—THE CHINESE BUILDING.

Scientific American.

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NEW YORK, SATURDAY, SEPTEMBER 7, 1878.

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(Illustrated articles are marked with an asterisk.)

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THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 140,

For the Week ending September 7, 1878.

INDEPENDENCE AMONG ARTISANS.

A number of years since a hosiery factory was started in one of our country towns, and workmen for it imported from England and Wales; for a little while all went on well, but finally the company failed and the works were permanently closed.

When deprived of the factory work, most of these workmen, sensibly recognizing that work was better than idleness and bread more sustaining than any amount of grumbling, instead of becoming burdens upon the community in which they had cast their lot, set up, each of them, a hand loom or two in his little house or room, and continued the manufacture of the goods which they had produced at the factory, and by the aid of the country storekeepers disposed of them to such advantage that now they are all in independent circumstances, and can with difficulty supply the demand for their especial productions.

We cite this one of many instances which have come to our knowledge to indicate what may be done by many of those artisans with us who are now out of employment.

To our mind the past years of prosperity, of high wages, and excessive demand for workmen were, generally speaking, far more hurtful to the laboring classes than the few recent years of depression and stagnation, for in the recent and present times are sown the seeds of patience, self-denial, and self-reliance, which will bear good fruit if properly cultivated and trained.

The chronic superabundance of the labor supply in the older countries has developed some conditions full of useful suggestions to us.

Wherever we travel there we are surprised to learn that a large proportion of the smaller articles of manufacture, with which, in some instances, the trade of the world is supplied, are made by artisans in their own houses and with the simplest appliances; and we find there also, in almost every large town or city long established, business houses whose sole business it is to receive and distribute these goods, to find markets for the handiwork of the independent workman.

We know of prosperous firms in England who do a very extensive trade in this way on an investment probably of not more than $10,000. Obtaining samples of their productions from the various artisans so employed, they intrust them to their "drummers" or "commercial travelers," who travel in every direction exhibiting them and soliciting orders; on receipt of an order the special workman is notified, and soon makes his appearance with his basket or bundle of goods, which are inspected and paid for according to previous agreement. The goods are then put up in the conventional packages and shipped according to order.

Almost every variety of article of household and builders' hardware, wooden and tin ware, brushes, brooms, etc., made by independent working men and women, are thus collected and disposed of by this one house; and this is but a sample of the hundreds that are engaged in the same business.

Thousands of our artisans could thus make themselves and families independent of corporations and capital, and secure against the pressure of hard times.

Of course it is not to be expected that all the articles thus produced would equal in finish those manufactured by improved machinery, nor that they could be sold at such a profit as if they were manufactured on a large scale; but the independent workman would neither expect nor require such profits as are necessary to the life of a corporation, with its costly buildings and machinery and its salaried officials; and he may be always sure that any intelligent labor of his will enhance the value of whatever kind of crude material it is applied to, in a measure sufficient for his needs and comfort.

While we would advise and encourage to the utmost general independent work of this kind, we recognize the need of another element to insure its pecuniary success.

Established in most cities are women's aid societies, whose charitable business it is to receive and sell the innumerable articles of women's handiwork, and whose labors in this direction have kept distress and despair from many households. These societies supply a want long and keenly felt; willing and skillful hands these were, but they could not keep the wolf from the door without the intervention of this powerful ally.

All over the land, too, in every town and city, associations of mechanics have established stores, "union" stores they are called, for the purchase of provisions and groceries at lowest prices, and the sale of them to the members of the associations at but little above cost, thereby securing in this direction to their beneficiaries all the advantages of combined capital and enterprise.

These aids to the poor and impoverished, admirable so far as they go, are still far from satisfying all the conditions; the women's aid societies help the impoverished, but rarely the poor; the "union" stores furnish cheaper food to the poor and struggling artisan, but afford no direct help to his efforts at independence.

An incentive, a hope, a certainty indeed must be held out to him, for he cannot afford to risk a day of his precious time on anything speculative; he must be assured of a strong ally before he can dare to make the effort for liberty And in what better way can this assistance be secured than through "union" associations for the sale of every kind of handiwork produced by these workmen?

THE unparalleled feat of thirty-nine consecutive bull's-eye shots, at eight hundred yards, has been made on the Wheeling (Western Va.) range by Professor Dwight, in the competition for a position in the rifle team of this year.

WHAT AMERICANS HAVE DONE FOR TURKEY.

A late issue of the *British Quarterly Review* devotes a large amount of space to an appreciative survey of the incidental and secular results of recent American labors in Turkey, and shows that those labors have not only been enormously beneficial to the people of Turkey, Asiatic Turkey especially, but also the chief source of the world's scientific knowledge of the geography and ethnology of those regions. For half a century the civilizing influences at work in Asia Minor have been mainly of American origin; and it is gratifying to know that the new protectorate of the East is predisposed by faith and blood to treat with fairness if not with favor the agencies which American missionaries have established there for the amelioration of the physical and social conditions of the people, as well as for their intellectual and moral enlightenment.

Leaving out of view the work of religious reformation which our missionaries have been engaged in, not because that work is not appreciated, but because the British public is already somewhat well informed in regard to it, the *Quarterly* writer dwells at great length upon the more apparent results of New World efforts to introduce modern ideas and modern civilization into the very heart of the oldest part of the Old World. This is done by reviewing what Americans have accomplished in the Turkish Empire in respect to the following particulars: 1. Exploration; including some notice of the physical geography and ethnology of the country. 2. Literature and education. 3. Medical practice; and 4. The improved condition of woman.

Under the first head the reviewer notes with more or less of detail the explorations carried out by thirty or forty American students of the East, some of which, like the exploration of Palestine by Robinson and Smith, and of Armenia and Persia by Smith and Dwight, mark eras in antiquarian research. One of the marked peculiarities of the Turkish Empire is the great number of separate races over which the Sultan so imperfectly rules. Among them are the Kurds, the Osmanli Turks, the Arabs, the Yezidees, the Greeks, the Bulgarians, the Circassians, the Copts, the Armenians, the Druses, the Maronites, and the Turcomans, besides great numbers of occasional and straggling residents, as gypsies, Persians, Hindoo Fakirs, and wanderers from the interior of Africa and from the most distant regions of Central and Eastern Asia. In answer to the question, What light have the Americans thrown upon the national characteristics of these previously little known peoples? the reviewer says that "in their published works and letters the Americans have brought out in the clearest manner the marked and peculiar characteristics of each nationality."

The tribute paid to American efforts in behalf of literature and education is even more generous, and it has been fairly earned. Fifty years ago the press was unknown in Turkey; there was not a single school book in the spoken languages of the country; and modern science was a thing undreamed of. Now, in addition to the Scriptures in all the leading languages and most of the dialects of the country, full lines of school books are published in Armeno-Turkish and Armenian, besides works in Arabic on anatomy, chemistry, natural history, physiology, botany, surgery, materia medica, mental philosophy, physical diagnosis, and astronomy. Treatises on pathology, geology, and history are in course of preparation. The reviewer says: "The testimony of those best qualified to judge in regard to the character of these books is that they are well prepared, both in respect to matter and the style of the language." Up to 1875 the mission presses at Constantinople and Beyroot had printed a total of 446,460,120 pages in Armenian, Armeno-Turkish, Greco-Turkish, Bulgarian and Arabic.

Limited space forbids any attempt to describe the educational work done in the schools and colleges established and sustained by American efforts in the Turkish dominions. Suffice it to say that there are two hundred and ninety common schools, with nearly twelve thousand pupils of both sexes; fifteen girls' boarding schools of higher grade, with between four and five hundred scholars; several high schools for young men; seven theological seminaries, and three colleges. A fourth college has recently been projected.

Most interesting is the account given of the labors of American physicians in administering to the varied wants of a people otherwise destitute of intelligent medical treatment. The reviewer says: "We find ourselves embarrassed by the great amount of information before us in regard to the character, extent, and results of this medical work in Turkey. It is all the more worthy of note because it is unknown except to a limited circle in the United States, and scarcely at all in England. For a long period of years well educated physicians and surgeons from America have been quietly working in all parts of Asiatic Turkey These gentlemen have made extended and interesting reports in regard to the diseases of the country, the climate, the state of medical practice, and their own special labors." These reports recall apostolic times, when the gratuitous healing of the sick, the maimed, and the blind preceded and prepared the way for the work of evangelization. The reviewer takes leave of this part of his subject reluctantly, feeling that he has done scant justice to the immense amount of hard and often self-denying labors of the American physicians in Turkey, most of whom laid down their lives in the cause which they had espoused.

When the Americans first began their work in Turkey the set of public sentiment was very decidedly against the education of women; this among Christians as well as among Mohammedans. The effort to make women sharers in intellec-

tual progress was met with opposition and often with derisive laughter. Yet by perseverance and tact a public sentiment in favor of the education of women has been widely established. Several thousands of adult women have been taught to read, and the husbands and relations of these female readers are proud of them. And the new public sentiment further shows itself in the interest taken in the American schools for girls. Pashas, civil and military officers of high rank, ecclesiastics, and wealthy men of all the different nationalities attend the examinations, and express their hearty approval of the work. The aid of the press has also been successfully invoked in aid of more direct efforts on the part of intelligent and earnest American women, and the women of Turkey have been largely raised to a higher level of life thereby.

In conclusion, after speaking of the very limited financial aid which the people of England have contributed to this work, the reviewer remarks that the real aid which the Americans have received from Great Britain has been in the strong moral support which has been given them by the British Government; and he adds: "We are sure that in the future as heretofore our American brethren in their beneficent labors may count on the countenance and support of our government, as of our ambassador at Constantinople and our consular agents in different parts of the Turkish dominions. The world at large, and especially thoughtful students of social and political as well as of moral and religious questions, will watch with deep interest for the ultimate results of the efforts which the Americans are making for the regeneration of Turkey, and which have the hearty sympathy and best wishes of the people of England and of Protestant Europe."

All this was written before England's protectorate of Asiatic Turkey was publicly thought of. We are confident that the changed political relations between England and Turkey will not change in the least the attitude of English feeling toward what is specifically our American work in the East. And if England succeeds in her designs for the commercial and political renewal of Asia Minor, the good seed already planted there by American zeal and philanthropy will be not the least of the factors of the new order of things.

SOME EGGSTRAORDINARY INVENTIONS.

Unlike the Patent Offices of all other countries, the American Patent Office is in spirit and action essentially democratic. Its clientage includes nothing less than the whole people. The richest inventor seeks its certificates, and the poorest is not refused a hearing; no man so learned that his brightest thoughts may not fall within the scope of Patent Office routine; none so ignorant that, if he thinks he has a novel idea, the office will fail to give it due attention. Whether grand or simple, each new idea is courteously entertained, the ruling principle being that it is better that ninety and nine profitless ideas be patented than that one genuine and fruitful novelty should be refused its proper recognition. Some of the most important inventions have been exceedingly minute in size and insignificant in appearance; accordingly the rule very properly is to err, if at all, on the side of liberality to inventors. If an inventor's idea be good, he ought to have the benefit of it; if worthless, it certainly harms no one to let him have the exclusive control of it. And whether useful or useless must be determined in the great majority of cases by actual trial in competition with other ideas, not by any examiner's *a priori* judgment, however intelligent he may be.

In view of the broad streak of foolishness that runs through humanity as a whole, it is not at all surprising that out of the hundreds of applications for patents received by the Patent Office every week there should be a sprinkling of those open to criticism on the score of practical uselessness. Nor is it strange that among the applications granted a few should strike the uninterested observer as—funny, to say the least. The wonder is, rather, that they are so few. Possibly they seem all the more ridiculous by contrast with the high average worth and gravity of the general work of the Patent Office.

Be that as it may, it never fails to strike one as consumedly funny to be advised, under official seal and signature, that the United States have granted letters patent to A., B., or C. for—well, say a pinhole in the big end of a pickled egg!

Seriously, that is just the point of the specification upon which patent No. 205,313 was granted. The patentee calls it "a new and useful improvement in processes of treating eggs," the object of the improvement being to provide a means for preventing the bursting of pickled eggs when boiled; said means consisting in the piercing of a small hole in the egg shell over the air blister. The hole is too small to be observable, yet "sufficient to allow of the expansion that ensues when the egg is immersed in boiling water, and thus the liability of such eggs to burst their shells in boiling is obviated." By this ingenious process old eggs, the patentee avers, are made as good as new-laid eggs, and they are much cheaper. What he wants to do with his old eggs after they are boiled, he does not say. Possibly that, like the suitable instrument for piercing the shells, may constitute "the subject matter of another application now before the Patent Office." If so, we trust the application will be promptly granted; it would be such a blessed relief to travelers to have some one man monopolize the use of stale eggs, and so keep them from the breakfast tables of hotels and boarding houses

No fear that the normal, or abnormal, food supply would be seriously diminished by this diversion of pickled eggs to other than breakfast table uses. The ubiquitous inventor has provided against that in patent No. 170,670; Mr. Joseph A. Griffin is his name. His invention relates to "that class of compounds used to facilitate and improve the processes carried on in the preparation of food, and also to improve the quality of cakes, pies, puddings, bread, biscuit, and other articles of food," in which his compound, "a substitute for eggs," is used as an ingredient. This compound, the patentee declares, is a perfect substitute for eggs in all culinary and other uses to which eggs have been commonly applied, is cheaper, and will produce better results than eggs themselves. We have diligently inquired in the markets for chickens hatched from this superior egg compound, but failing to find any we cannot furnish the reader with any particulars with regard to their appearance or quality. The substitute, the specification further states, will keep longer without decomposition than fowls' eggs, and "contains in equal amounts more of the essential qualities for which eggs are valuable than eggs themselves."

This is most remarkable; and it must be true, or else Mr. Griffin would not have spent his money on it in patent fees. Still we must confess we have our doubts of the availability of the substitute for all egg uses, say for political purposes or for personal expostulation with an offensive public speaker. It is not clear how it could ever be made as fragrant and explosive as Mr. Stempel's eggs, for instance (Mr. Omar A. Stempel is the gentleman who patented the pinhole), or make so handy a missile to throw. Still you cannot expect everything from an invention.

As a matter of purely scientific interest we will add that Mr. Griffin's egg compound, which is so much better and cheaper than real eggs, is composed of cream tartar, tartaric acid, alum, soda bicarbonate, sugar, curcuma, gum arabic, sulphur, and starch, in proportions specified. Seeing that real eggs contain only albumen, mucus, water, and a little saline matter, the superiority of the substitute will be readily appreciated.

THE MINING OUTLOOK.

Recent accounts from our Western and Southern gold and silver mines are indicative of renewed and increasing activity and excitement; abandoned mines are being reworked at a profit, at others the forces of labor and machinery are being increased, and new ones of great richness are almost daily being discovered.

It would seem, too, from the reports, that these enterprises form a safe and legitimate channel for the outflow of long stagnant capital, and that more intelligent administration, combined with improved processes and machinery, now assure good returns where formerly, for lack of these, a general bankruptcy overwhelmed everything.

The mining fever which attacked our people just after the close of the war is still a sad recollection to many; absolute prostration alone seemed to restore them to their senses; they paid no attention to disinterested advice and warnings, none to the teachings of knowledge or experience, but threw themselves and their fortunes prone at the feet of every adventurer who had been, or said he had been, in the El Dorados of the West, and had a nugget of gold or silver to exhibit. His dictum on all points connected with mines, mining and reduction processes and machinery was received with reverence, and the results were what might have been expected—an unreasoning suspicion and abhorrence almost of all mining projects.

A healthier feeling has gradually obtained, and these important interests are now in a fair way to secure the attention they merit; but still one caution must be observed if we would guard against a return of the fever: the popular false impression that a gold or silver mine necessarily brings wealth to its owners must be corrected; it must never be lost sight of that the rules and conditions that govern other businesses must be applied even more stringently in these cases, where the management is rarely under the direct supervision of those who supply the sinews of war. Common sense is quite as necessary for the successful working of a rich bonanza as for an ore yielding but $20 to the ton, and economical machinery and processes just as desirable.

These late mining reports, after making due allowances for high coloring, we esteem to possess much interest to all concerned in the development of our riches or the increase of industries that will afford employment to those lacking it.

In Arizona the lack of sufficient and cheap water and fuel appears to be the chief obstacle, in many instances, to very successful mining; but as the work progresses water from the shafts will be available for many of the purposes, while simpler methods of working or the transportation of the ores from various mines to one central, favorably located reduction establishment will solve, as well, the question of fuel. Some of these ores are said to yield, on an average, from $400 to $1,200 per ton, and from one mine a nugget of native silver weighing over a hundred pounds has just been taken.

Idaho's and Montana's prospects are brightened by further development of their mines and a good increase of milling machinery.

Utah miners very generally appear to be satisfied with their condition and outlook; the largely increasing investments there, as well as the better results which experience has given, inspire them with confidence.

In Colorado, Nevada, and California, the older gold and silver mining States, many rich deposits of ore have recently been opened, and never, apparently, has there been such a healthy condition of mining matters there as at present.

In all these places many of the old confidence operators are, of course, to be found, and many are the victims who learn the danger of hasting to get rich; but with all this it is beyond question that never before have there been such opportunities as there now are for intelligent and profitable investments in mining properties there

We are not unmindful of the fact that just now there are great excitement and speculation in certain mining stocks that are manipulated in San Francisco, and that naturally enough, in many instances, the reports from mining regions are colored with the view of taking advantage of these conditions; but of speculative stocks we are not speaking; we write of the real, substantial wealth of the mines.

On our Atlantic coast, from Virginia to Georgia, there is also a renewal of interest in gold mining, and reason to believe that safe investments may be made there.

In every direction investments of English capital in our mines are reported and welcomed, and undoubtedly these investments are the strongest possible expressions of faith in their values, but they are no guarantees of them. We should prefer to rely on the opinions of our own experts, who have for fifteen years or more been combining theory and practice with careful observation of our special mineral deposits.

No Hard Times in "Temperance" Villages.

Mr. William E. Dodge, the well known manufacturer and merchant of this city, when recently before the Congressional Labor Committee as a witness, said that his firm, employing some 2,000 persons, made it a rule that persons engaged in their manufacturing villages should not use intoxicating drinks. As a consequence there was no complaint of hard times among them. The villages named by him were: Ansonia, Conn.; Dodge Mills, near Williamsport, Penn.; Tobyhanna Mills, Warren County, Penn.; St. Simon's Mills, Ga.; Wabasheen Mills and Magnattiwan Mills, Ontario, Canada, and Collingswood Mills, Canada. "Many of our employés," Mr. Dodge continued, "are property owners. They own their dwellings and have reared large families. Some of them have been with us ten, twenty, and twenty-five years. Our men have not suffered during this depression. They have accepted wages which we could pay, and there has, therefore, been no special distress among them. Crime is practically unknown among them."

The Use of Salt for Museum Purposes.

At a recent meeting of the Geneva Society of Physics and Natural History, Professor Alph. de Candolle exhibited a glass jar containing fruits of the coffee plant, collected before maturity, in Mexico, preserved in a liquid which chemical analysis proved to be salt water. It is fifty years since the jar thus filled was hermetically sealed, under the eyes of Aug. Pyr. de Candolle, and to-day the coffee beans which it contains are in a thoroughly satisfactory state of preservation. The water contains a solution of common salt, and very small quantities of other chlorides or salts. No gas was found in solution, showing that the water must have been boiled, and introduced while hot into the jar. This experiment may prove a valuable hint to curators of natural history and medical museums as to the substitution of salt water for alcohol (the inconvenience of which every one knows) for the preservation of organic specimens.

Pre-eminence of the American Exhibits.

The London *Times* of August 24, in an editorial comment on a two column description of the mechanical display of the United States at Paris, which it prints, remarks that "the preëminence of the mechanical genius of the citizens of the United States may be admitted, and is illustrated, not for the first time, in the Exhibition at Paris."

The *Times*, without pretending to exhaust the whole secret of the phenomenon of inventive genius on this side the Atlantic, finds reasons therefor in the greater efficiency of labor here, and the increased cost and difficulty of hiring it. The conditions of the Union as an economic society, it holds, drive our inhabitants toward invention, and here, as elsewhere, necessity may be said to be the mother of it.

American Institute Exhibition.

Persons intending to exhibit this fall should at once forward their applications for space to the General Superintendent, New York, otherwise they will not be able to secure the room they may desire. The managers are exceedingly anxious to have the exhibition in good shape upon opening day (September 11), and will do so if the exhibitors will only be as prompt as they should be in placing their exhibits in order.

Decision in the Crusher Case.

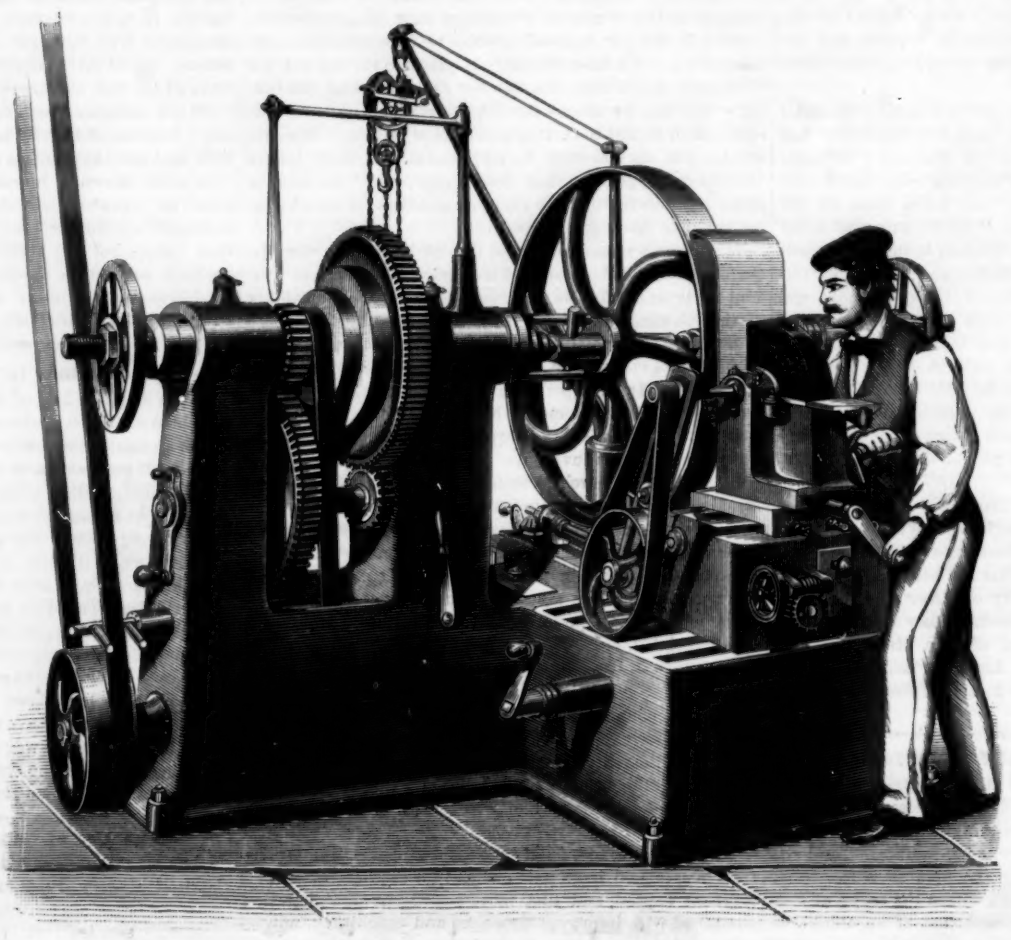
The decision of Judge Blatchford, United States Circuit Court, in the case of the Blake Crusher Company *versus* Copeland & Dodge, owners of the Alden Crusher, was rendered August 8. The Alden patent was held to infringe the Blake crusher, and a preliminary injunction was granted.

ACACIA IN CRACKED NIPPLE.—A simple means recommended by an Italian physician, for the relief of cracked nipple, is to powder it repeatedly with pulverized gum arabic. Immediately after the child has sucked it should be thoroughly dusted over the surface, and the nipple protected from the air.

NEW PULLEY TURNING MACHINE.

M. Denis Poulot exhibits, in Machinery Hall of the French Exhibition, a new machine for turning pulleys by the use of emery wheels, the illustration of which presented herewith we take from *Revue Industrielle*. The grinder is mounted on the upper part of the carriage, and receives motion from two horizontal shafts, connected by a vertical shaft and conical gearing.

The vertical shaft placed on the axis of rotation of the carriage allows the grinding wheel to be turned radially so as to give to the periphery of the pulley the required curve. The grinder is 15·6 inches in diameter, 3·2 inches thick, and makes 1,500 revolutions per minute. The driving pulley of the machine makes 150 revolutions. The pulley to be turned is given a velocity which depends upon its diameter and the hardness of the metal. Means are provided for running it at six different speeds. The details of construction of the machine will be obvious from our engraving.



THE PARIS EXHIBITION.—NEW PULLEY TURNING MACHINE.

The Hayden Expedition.

In a letter to the Interior Department, dated August 3, Professor Hayden reports that up to that time the expedition had been eminently successful and had secured much valuable information. Important observations were made of the eclipse of the sun July 29. The first primary station for the season's survey had been made on the Wind River Peak, and at the time of writing the expedition had reached the northern end of the Wind River Range. The Grand Teton was to be attacked next, and after that the triangulation party, under Mr. Wilson, would go to Henry's Lake to make a primary station, while the photographic division, under Mr. Jackson, would proceed to the Yellowstone Park. No information had been received from the party north of the valley of the Green River, under Mr. Garnet, or from Mr. Clark's party in the Teton district. The Indians had not been troublesome.

SHEAF-BINDING APPARATUS.

Although the principal attention of inventors in this line has been turned to attachments to the reaper, several parties in England and America have addressed themselves to another mode of solving the problem.

It is claimed by some that grain is better saved by letting it lie awhile and cure in the swath, and this we know to be true in regard to oats, though it has never, within my knowledge, been customary with wheat. Under the oldest systems, where wheat has been put in sheaf, the binding follows closely the cutting, whether by sickle, cradle, or machine.

An independent binder has been promised from England, although it is not yet (July 1) in the Exhibition. The inventor places his work before the French public with the following remarks, which are, however, in the main, applicable to all binders:

"The price of manual labor has greatly increased in France, and this augmentation is much increased in times of pressing work which cannot be delayed, such as that of harvest. The necessary complement of the reaper is the binder. We think we offer a great service to agriculture when we present an independent mechanical binder which is practical."

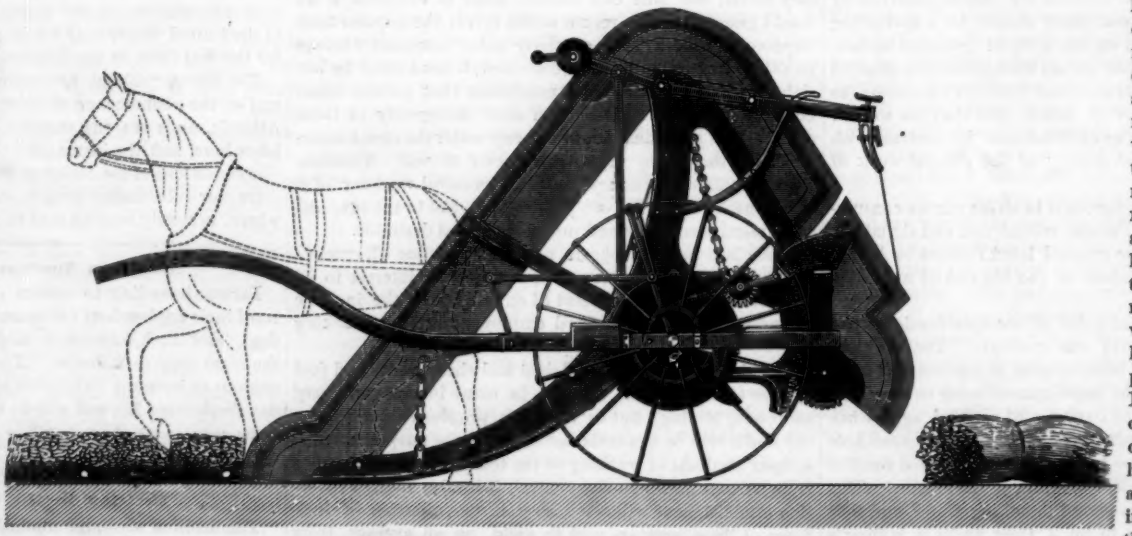
The machine is drawn by one horse alongside of the swath, the grain ascending a slightly inclined platform into the loop of the wire, when a swinging arm conducts the wire around it, brings the parts of the wire in contact, so that they may be twisted together, and the wire cut. The end is left in a pair of grippers, and the arm ascends, paying out wire enough for another sheaf, and assuming the position shown in the engraving.

The machine is intended by the inventor to follow the cradle or the reaping machine; to bind larger or smaller sheaves with a tightness superior to the ordinary handwork; to pick up the grain cleanly from the swath; to make the binds at such distances from the foot of the sheaf as may be suitable to the length of the straw.

The machine is drawn by one horse, and driven by a man on a special seat. The apparatus is also adapted to the sheaves of straw received directly from the thrashing machine, and is claimed to be able to bind from 400 to 800 sheaves per hour, according to the nature of the crop.

Price of mechanical binder adapted to the harvest field, 800 francs. Binder for attachment to thrasher, 400 francs.

It does not look very promising, but may be suggestive to some of your readers. EDWARD H. KNIGHT.



LANDELLE'S MECHANICAL BINDER.

THE *Annales des Ponts-et-Chaussées* has published some statistics which show that a person had, in France, in the time of the old diligence, a chance of being killed in making 300,000 journeys, and of being hurt once in making 30,000. On the railways, from 1872 to 1875, the chances were reduced to one death in 45,000,000 of journeys, and one injury in 1,000,000. Thus a person continually traveling by rail at a speed of 31¼ miles an hour would have had, during the three periods above indicated, the following chances of being killed: from 1835 to 1855, once in 312 years; from 1855 to 1875, once in 1,014 years; and from 1872 to 1875, once in 7,450 years.

Benefits of Ill Health.

As long as the human machine works smoothly and without effort, it is all but unconscious of its own existence; but as soon as it begins to creak and groan under its task, it is apt to become overconscious of its work, and to spend its energy in mental introspection. Hence follow two results. In the first place, the invalid becomes more versed in the mechanism of mental processes than in their external consequences. He differs from healthy men in paying regard rather to the state of feeling produced by a sensation than to the outward expression of that state of feeling. In the second place, it follows from his enforced inactivity that the invalid's stock of inductions is chiefly founded on his subjective experiences, and not, as is the case with other men, on the observation of the acts of others. These two characteristics are almost essential factors in the growth of two excellent qualities in man—sympathy and humor—neither of which, it would seem, can exist in its most subtle form where the whole tone of mind is of an objective character. We are far from wishing to trace all sympathy and all humor to a pathological cause, but it appears to us that a condition of ill health often gives to these qualities a character which they would not otherwise possess.

Instances in favor of or in opposition to this view will occur to every one, but the lives of poets and humorists supply us perhaps with the best material for forming an opinion regarding it. What especially strikes us in connection with the poets is that those who have been men of vigorous health have written for the most part objective poems, while the invalids among them have given us verses whose chief distinctive feature is sensibility. The one class deal more with the actual, the other with the ideal. Compare, for instance, the veterans Chaucer and Goethe with the consumptives Shelley, Keats, and Schiller. We are much inclined to regard the well known "Resignation" of the last-named poet, beautiful as it is, as a purely pathological production. Again, in the case of the humorists, it is a somewhat suggestive fact that Sterne, Lamb, and Hood were all sufferers from congenital maladies. We confine ourselves to mentioning these few authors, because both their writings and the circumstances of their lives are familiar to all; but numerous instances may be found among less known men, all pointing to the same truth. It is, indeed, a popular generalization that poetry goes hand-in-hand with a feeble organization, and we have no doubt that if they had dared, people would have applied to the poets a definition very similar to that which they have given to the tailors. Further, it is not only among public men that a generalization as to the effects of ill-health has been popularly though unconsciously made. Even in private we often hear it remarked how much illness has improved a certain person. No one can have failed to observe how, in certain cases, prolonged ill health has changed a brusque and self-centered woman into a gentle and sympathizing one, and has grafted on a careless and overbearing man the virtues of kindliness and consideration for others. If this be so, disease cannot be the unmitigated misfortune that the healthy are apt to imagine it. If we consider the whole case, it must be confessed that even ill health has its advantages.—*Medical Examiner.*

TABLE cloths of white paper are reported as the latest housekeeping novelty. It is urged, as a great advantage, that when soiled they are well adapted for kindling fires.

American Railway Cars.

Although the style of railway passenger carriages so long in use on European railways is still strongly adhered to abroad, the American style of parlor and sleeping coaches is slowly gaining a permanent foothold on foreign roads, and especially in England. These coaches can be introduced without any radical interference with long established foreign class-distinctions. They will merely supersede the exclusive and incommodious apartment carriages that have been so long in vogue there. And this change will be all the more rapid in consequence of the great numbers of Americans that every year visit Europe for pleasure and recreation, and naturally prefer the kind of traveling comforts they have at home. In other words, Europeans will ultimately be broken into our system of traveling, as respects the style and pattern of cars, instead of we into theirs; and this will be a fair test of the comparative merits of the two. It will take longer, of course, to supplant the second and third class carriages on foreign roads with our ordinary day cars. The mass of the population are wedded to the antiquated system, and the prejudice is shared by great numbers of intelligent railroad men, who look with suspicion upon bogie trucks, long cars, bell cords, and the passing from one car to another while trains are moving. It is a characteristic of the Old World people to resist innovation. English railway mechanics adhere to their costly and rigid locomotives, with big driving wheels, because they run well on their excellent and well-ballasted tracks. They are not willing to admit that a machine that costs one third less, and which is comparatively loose-jointed like a wicker basket, would do just as well on these same tracks, and a great deal better even upon inferior road beds, such as are to be found in Australia, India, and other English dependencies.

For practical utility, our own engine builders are leading the world; while, at the same time, American-built cars, for lightness, strength, and elegance of workmanship, have no successful competition. Our passenger cars of the various classes for steam roads, owing to their peculiarity of construction, cannot be compared with any foreign ones of the same kind, because none such are built. But this is not the case as respects horse cars for street roads. Here, aside from foreign import duties, the competition is direct, and from the evidence which is constantly accumulating it is no exaggeration to say that our street car builders are taking the lead in all the markets of the world. Their cars are lighter and stronger, are better designed, have better appliances for convenience and comfort in the way of newly discovered improvements, and will endure longer and more severe service, than any cars of the same class built in Europe. Their superiority is analogous to that of American-built pleasure carriages and light vehicles of every class, which have long been noted for their extreme lightness and apparent fragility, yet with no sacrifice of strength. Wherever our horse cars have gained a footing abroad, their superior wearing qualities have more than compensated for any excess in first cost, and on this account alone they would be preferred. It should also be borne in mind that all material and machinery used are of home production.—*National Car Builder.*

Casts from Living Forms.

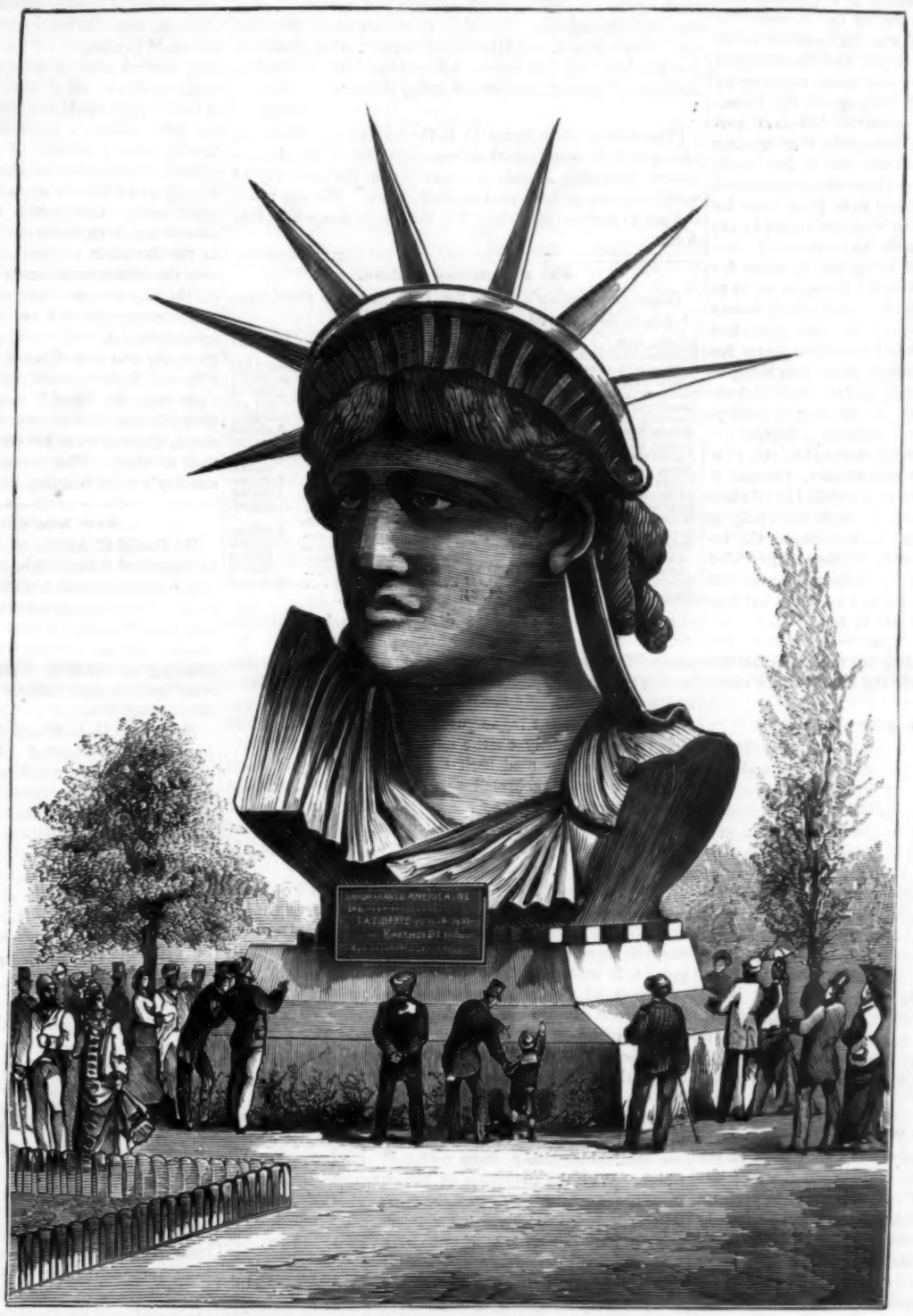
I was taken by a friend to see the wonderful plaster casts of living human beings, which are among the curiosities of the Russian department. How the thing is done it is impossible to imagine, but there the two statues are, recumbent female figures, undoubtedly taken from living women. One lies slightly turned upon her side, her lips parted in a smile, as though she was striving to suppress a laugh. The other, who has much the finest form of the two, lies face downward, her feet crossed, and her head pillowed on her folded arms, as though she had thrown herself down to sleep. The minutest details of the texture of the skin, nails, etc., are very perfectly reproduced, the "goose flesh" wherewith the skin is covered being amusingly noticeable, and showing that the preparation used for these casts, the composition whereof is a secret, must be applied cold. Then all the little indentations in the soles of the feet and the palms of the hands, and the curves of the nails, and their rimming of skin and flesh are reproduced with even startling accuracy.—*Paris Correspondence of Philadelphia Telegraph.*

BARTHOLDI'S STATUE OF LIBERTY.

Bartholdi's statue is pretty well known by this time in America, so many thousands having looked at the hand and torch which were set up in the Centennial grounds, and afterwards in Madison Square, in New York city.

The head now adorns, if that be the proper word, the esplanade between the Palais du Champ de Mars and the Seine. On the day of the inauguration of the Statue of the Republic, in front of the Palais, the authorities, the crowd, and the band walked over to the Bartholdi bust, gave the "Star Spangled Banner," three cheers, and then rushed back to repeat the "Marseillaise" around the draped figure of the Republic. The statue is designed to be 105 feet high, on a pedestal of 82 feet additional. The bust is 29½ feet high, and a fraction over 13 feet in diameter. It will be placed, when completed, on Bedloe's Island in New York Bay, facing the City of New York. It is the noble gift of the citizens of the French Republic to the citizens of the United States.

E. H. K.



BARTHOLDI'S COLOSSAL STATUE OF LIBERTY.

Pygmy Elephants.

The collections from Malta, made by Admiral Spratt and Dr. Leith Adams, of the remains of pygmy elephants found in the caves and fissures are now all acquired by the British Museum. Dr. Leith Adams' series have been there some time, and the addition just made of Admiral Spratt's completes the data from which our knowledge of these elephants is drawn. When they were first discovered great interest was excited in them on account of their diminutive size. Of the three distinct species now recognized, one was three feet high, another five feet, and another somewhat larger. The crowns of some of the full grown teeth do not exceed an inch in length, and the tusks a foot. Hundreds of fragments of animals of all ages were found, quite ample to make the knowledge of the animals fairly exact. It is curious that with these remains were found those of a gigantic dormouse. They have all been fully described in the "Transactions of the Zoölogical Society."—*London Times.*

The Oneness of Mental and Physical Health.

The intimate connection between the physical man and his moral actions is often overlooked, and perhaps as often misunderstood where it is taken into consideration. On the one hand we have schemes of education of the *cramming* kind, where every effort is made to fill the mind with facts and theories, with little or no regard to the body's wants. Children are made myopic, their brains over-stimulated, their growth stunted, and their senses left untrained to perceive the glories and the teachings of the natural world around them; or, on the other, the cry is for muscular Christians, and base ball, rowing, running, turning somersaults, and boxing take the place of desk work. Muscularity is indeed gained, but Christianity? The answer is ambiguous. There is just as much risk of overdoing the physical as the mental; and at present, among our college undergraduates, we should think a little more.

In the one condition, when over-attention is given to physical culture, there is a development of the coarser, crueler, more brutal tendencies of the character; in the contrary one, of a sneaking, passive, essentially human viciousness.

A strong moral nature can only be secured when there is a symmetry in the culture of the powers, when the emotions are sufficiently awake and refined to respond readily to the finer excitants of beauty and sympathy, but not so on the alert as to lead to any other action than that which the reason dictates.

It was the folly of the ascetic school which taught that the sensual part of man, his animal nature, should be sunk out of sight, stamped out, as it were, under the preponderance of his higher powers. Such a purpose cannot be achieved. Food and drink, in sufficient quantity and of good quality, and the moderate use of all his functions, are essential to the best workings of the faculties of intelligence. Modern science illustrates, in ways which admit of no doubt, how dependent is the exercise of the abstractest faculties of the mind on the functions of the body. A curious instance is related by the Italian Prof. Mosso, the inventor of the plethysphygmograph which bears his name.

On one occasion a classical scholar spoke somewhat contemptuously to Mosso of his plethysphygmograph, and Mosso replied that by it he could tell whether the scholar could read Greek as easily as he did Latin. The scholar was incredulous; but his arm was put into the apparatus, and a Latin book was handed to him to read. While perusing the book the curve sank very slightly. The Latin book was then taken away, and a Greek one given to him instead. The curve immediately became much deeper, showing that more blood had gone to the brain in order to maintain the greater mental exertion required for the reading of the Greek, and disproving the scholar's statement that he could read the one as easily as the other. "A sick man," said Dr. Johnson, "is a scoundrel;" and he was right, for unless a healthy brain is present to guide the judgment, we cannot expect a true and sound opinion, nor a correct action as its sequent.—*Medical and Surgical Reporter.*

Correspondence.

Our Washington Correspondence.

To the Editor of the Scientific American:

Under the call of the Secretary of the Interior for plans for remodeling or repairing the burnt portions of the Patent Office, fifteen were submitted by architects from different portions of the country. A committee of experts appointed by the Secretary to consider the various plans has reported in favor of that of Mr. Vrydagh, of Terre Haute, Ind., and it is now under consideration by the Secretary. The main feature is the proposed addition of another story, some thirty feet high, for the storage of models, above the present model halls, and the latter are to be cut up into smaller rooms for office purposes. Under this plan, if finally adopted, the additional wing through the center of the present court, that was proposed some time since, would not be necessary. Whether or not another story could be made to harmonize with the building is a question that seems to require consideration, as well as the necessity for any addition at all if the building was surrendered to the sole use of the Patent Office, as it ought and was designed to be, instead of having some of its best rooms taken up by the Interior Department, while the business of the Patent Office has to be transacted in inconvenient holes and corners, and some of it in other buildings outside, thus running the risk of the loss of valuable records that if lost could never be replaced. Had the Interior Department never been allowed in the building, there would have been room for the storage of the rejected models in fireproof rooms in the basement, and the late fire would never have occurred.

The plan of Mr. Vrydagh is now being put in shape for publication in one of the architectural journals, so as to draw forward the criticism of architects and others before the final adoption of the plan. After it has been published by the architects' organ it is proposed to furnish plates for publication in other illustrated journals, the object being to obtain the fullest criticism on the plan, and to obtain and use such suggestions as may be of value in altering or modifying the plan before the change in the building is begun.

There seems to be an opinion among many that the proposed addition of another story is unnecessary, because if the system of compelling models to be furnished in all cases is done away with, requiring models in such cases only as may absolutely necessitate their use to understand the inventions, it is believed that the present building, if provided with a fireproof roof, would be amply sufficient for the use of the Patent Office authorities, as there is no doubt but that a new Post Office will have to be built to give room for the ever-increasing business of that department, which will leave the present Post Office building for the use of all the other bureaus of the Interior now in the Patent Office building.

THE BURNT MODELS.

The work of restoring the burnt models has been closed, as no further funds are available for the purpose, and the restored models are now being stored in the room over the south portico. Of a little over 80,000 patented models damaged by the fire, 18,544 have been cleaned, repaired, and painted, making them as serviceable for all the purposes of the Patent Office as they were before the fire. Many of them, which were warped, bent and crushed by the falling *débris* and heat, have been straightened out, put in shape, and, where necessary, wooden bases supplied, and the models thus restored make a very creditable display, many of them looking much better than they did before the fire. There is no doubt that hundreds of models, if not thousands, could yet be identified if sufficient funds could be obtained to pay for the necessary labor, but it is doubtful if Congress will be asked to vote any more for this purpose, as it is very hard to obtain money for matters that are much more needed.

PATENT OFFICE DECISION.

There has of late grown up a practice among some of the examiners of condemning claims for combinations of elements "arranged," "combined" or "adapted" to perform some function for which the combinations were especially made, on the ground that such claims were "vague" and covered more than the original invention warranted; arguing that such combination claims should be limited to the particular arrangement shown, and not allowed to be issued so as to cover any like combination under a different arrangement that would perform the same function. In a recent case of this kind (John Bigelow, sewing machines) the examiner refused such claims without the insertion of limiting clauses, because, as he asserted, if such claims were allowed there would be an end of the American patent system, as it would prevent patents being granted for subsequent improvements in the same line. In view of this there was nothing else for the applicant to do to obtain his rightful claims but to appeal to the Commissioner in person, who fully sustained the applicant's right to the desired claims, notwithstanding two prior decisions which apparently bore out the examiner's opinion as to the use of claims of this kind.

Washington, D. C. R.

Little Mothers.

To the Editor of the Scientific American:

Will you permit me to make one or two corrections in a paragraph headed "Little Mothers," that appeared in the SCIENTIFIC AMERICAN of August 24? The article referred to says: "Had the first been properly treated her life also might have been saved; but her physician would not destroy the child without the mother's consent," etc. Now, any person acquainted with the details of the case is aware that "to destroy the child" was unnecessary, as the infant was already dead; and also, that the great size of the child (5 lbs. 10 ozs.), compared with the mother's weight, and its very peculiar presentation, necessitated the performance of the operation of craniotomy before the body could be removed, and then the process of delivery occupied one hour. This was one of the most remarkable cases on record. Experienced physicians *were* in attendance, and the friends and relatives are satisfied that all was done that could possibly be done, *and as it should have been done.*

Again, the paragraph referred to says: "Minnie was married to Major Newell . . . . at the same time that her diminutive sister was married to Gen. Tom Thumb." If this is so, the little lady must have entered the matrimonial state at the age of 14 years—15 years ago. But I am inclined to think this is not correct, for the reason just mentioned, and also from the fact that Newell is now only about 23 years old. Major Newell and Miss Minnie were married about one year ago last July, but where, and on what date, is nobody's business, all parties interested keeping their own counsel.

NEMO.

[The statements referred to in the paragraph mentioned above were drawn from newspaper reports of the circumstances attending Minnie Warren's death, the accuracy of which reports we had no reason to doubt. We are much obliged to our correspondent for the correction.—ED. SCI. AM.]

The Population of Asia.

Behm and Wagner's tables for 1878 give the population of Asia as 831,000,000, distributed as follows:

Siberia, 1873	3,440,362	Japan, 1874	33,623,373
Russian Central Asia	4,506,876	British India within British Burmah, 1872	188,421,264
Turcoman Region	175,000	Native States	48,110,200
Khiva	700,000	Himalaya States	3,300,000
Bokhara	2,030,000	French settlements, 1875	271,460
Karategin	100,000	Portuguese do.	444,617
Caucasia, 1876	5,391,744	Ceylon, 1875	2,459,542
Asiatic Turkey	17,880,000	Laccadives & Maldives.	156,800
Samos, 1877	35,878	British Burmah, 1871	2,747,148
Arabia (independent)	3,700,000	Manipur	126,000
Aden, 1872	22,707	Burmah	4,000,000
Persia	6,000,000	Siam	5,750,000
Afghanistan	4,000,000	Annam	21,000,000
Kafiristan	300,000	French Cochin China, 1875	1,600,000
Beloochistan	350,000	Cambodia	890,000
China proper	405,000,000	Malacca (independent)	209,000
Chinese border lands, including Eastern Turkestan and Djungaria	29,580,000	Straits Settlements	308,097
Hongkong, 1876	139,144	East Indian Islands	34,051,900
Macao, 1871	71,834		

An old resident of China disputes, in a letter to the *London Times*, the reputed population of that empire. He says: "Twenty or thirty years ago, when China was less known than it is at present, and when the inland provinces had not been traversed in all directions by foreigners, it was only natural that the vague guesses of missionary and other writers, based chiefly on the misty calculations of native authorities who counted their own people by myriads and myriads, should be accepted as fact and received without much misgiving. There were no other data to go upon. China was known but to few people; and if these few assured us that the population numbered 400 to 500 millions of souls, we could only accept and wonder.

"Now, however, all this is changed. The interior of China is almost as well known at present as the interior of Russia; and if strict accuracy cannot be attained in the absence of any reliable statistics, still a fair approximation is certainly possible in estimating the population of the country.

"Those who are best informed on such matters in China at the present day do not set the figures at much over 220 millions of people, or an average of between 12 and 13 millions for each of the 18 provinces. I have frequently heard 200 millions mentioned as a fair estimate for China proper; but the most generally received opinion would limit the population to about 250,000,000. Any material addition to this estimate requires a basis of fact and figures not at present obtainable, either from native or foreign sources in China. With the exception of Sze-chuen and Quang-tong, there are not many provinces the population of which can with confidence be calculated at 15,000,000, while there are several, like Yun-nan, Quei-choo, Kan-soo, Shen-see, etc., which are considerably under ten millions each. The populations of the outlying dependencies of the Chinese Empire are not very numerous, and would not add materially to the sum total of the figures here given."

The Egyptian Lotus in Connecticut.

Mr. Charles Holmes of Hadlyme lately left at this office several blossoms of the rare and beautiful Egyptian lotus. They were gathered in Selden's Cove, an indentation of the Connecticut river, not far from Long Island Sound, famous alike for its shad and its lotus flowers.

The blossoms bear a general resemblance to the yellow pond lily, but are much larger and of a delicate pale buff color, and their texture and general make up are free from the coarseness of their little American imitations. They grow in about four feet of water, and are consequently mounted on long stems, while the leaves are like great elephants' ears. How these lotus plants happened to take root and manage to flourish where they are is one of the mysteries of Connecticut. Every sort of effort has been made to transplant them, but all fail. Even in Hamburg Cove, just below on the same river, though the plants have been set out there at all seasons of the year, in the hope that some time might prove the proper time, it has been impossible to persuade the plants to take root at all. An attempt to plant them in Bushnell Park, in this city, failed like the rest, and so did one at Cedar Hill Cemetery. New York persons have carried off the plants often, but only to see them die.

The blossoms are much sought after, a dozen boats being out at the same time after them, and as high as two dollars has been paid for a single flower, while rumor has it that the Lorillards from New York have put in there in their yacht, and bid ten dollars for them. There is no explanation of how the plants happened to start in Selden's Cove, though it is tradition that the seeds of the Egyptian lotus fell there or blew there from some shipload of Egyptian rags that was bound up the river, and that from this little beginning the rest came. Except at one spot on the North Carolina coast the plant does not grow anywhere else in this country.—*Hartford Courant.*

A Gold Mine in New York City.

When the Appleton building in Bond street was burned last year, the watches, jewelry, and silverware destroyed amounted to about a million dollars. The ruins were carefully worked over by the insurance companies, and all the larger masses of metal were taken out. Then the owners of the property subjected what was left to a thorough washing and secured a handsome sum for their labor. For months after a number of juvenile miners worked at the rubbish, and one enterprising little fellow, it is said, secured enough to set himself up in business, with a stand and newspaper route. Last spring the attention of two Western miners was attracted to the "mine," and after testing a bag of the dirt made a liberal bid for the privilege of working over the refuse scientifically. The offer was accepted, and for the next two or three months their operations afforded much entertainment if not instruction to crowds of curious spectators. A real working gold mine in the heart of a great city was something of a novelty. The miners, Messrs. Pier and Roberts, have finished their work at last, and declare that the "find" was one of the richest they ever worked; that they secured over $60,000 worth of precious metal, clearing some $20,000 above expenses and the cost of their privilege. The average yield was over $1,000 a day, one day's work bringing $1,700.

New Engineering Inventions.

Mr. Daniel C. Lyons, of Chelsea, Mass., is the inventor of an improved Gauge Cock, which consists in a perforated tube which slides through a stuffing box connected with the boiler, so as to bring the perforation in the tube into communication with the space within the stuffing box, and permit the escape of steam or water through the tube. The perforated tube is provided with a handle for operating it, and with a head upon its inner end for preventing its withdrawal from the stuffing box.

Mr. James R. Lamb, of St. James, Minn., has patented an improved Car Coupling. This invention relates to improvements in the car coupling for which letters patent were granted to the same inventor heretofore, dated September 18, 1877, and numbered 195,290, by which the construction of the same is simplified and the working made more reliable.

Mr. Edward L. Newell, of Butte City, Montana Ter., has patented an improved Amalgamating Pan made of wood, to be used in the reduction of silver ore. The pans may also be used in gold mills as settlers.

American Trade with Italy.

A scheme is on foot to establish a society for the promotion of American trade with Italy. It is claimed by the projectors that many of the native products of the United States, which are now comparatively unknown in Italy, could be sold in that country at a profit to American sellers and at a saving to the Italian buyers. It is claimed also that many of the products of Italy could be imported into America much cheaper than they are now imported from other countries of Europe. This is said to be especially true, on the one hand, of American cottons, and, on the other, of Italian silks, gloves, and laces. Mr. G. Fontana, who recently visited Italy in the interest of this scheme, said lately to a *World* reporter: "The Americans can send cottons, bleached and unbleached, to Italy and undersell the English cottons and surpass them in quality. At present the American goods are almost unknown in Italy. The Italians can send to America direct their Como silks, which are now sent to Lyons first and then sold to America for Lyons silk. They can send also the finest velvets, cheaper than the velvets now imported from France, and they can furnish the handsomest Venetian laces, for the lace industry of Italy is now reviving. The same thing is true of kid gloves, which are made as good as in France. Mr. Fontana added that a large number of the gloves sold in New York for French gloves are really Italian goods sent out here without being stamped, and stamped here with the names of French manufacturers. He mentioned one New York house which last year sold 80,000 dozen of these goods, and another which sold 30,000 dozen. The goods can be brought from Italy, duty paid, for $6 a dozen, and they sell here wholesale at $9 and $10 a dozen."

Temple's Comet.

The Smithsonian Institution reports that the Academy of Vienna announces the observation of Temple's comet at 9 o'clock on the 19th of July, 1878, in 15h. 17m. right ascension, 4° 15′ south declination.

Natural History Notes.

Why Flowers Open at Different Hours.—Sir John Lubbock alludes to the fact that flowers have certain particular hours for closing. This habit is a very curious one, and different flowers have different hours for repose. The reason, perhaps, is as follows: Flowers which are fertilized by nocturnal lepidoptera and other night flying insects would possess no advantage in remaining open during the daytime, and those which are fecundated by bees would gain nothing by remaining open at night. The closing of flowers, then, is connected with the habits of insects. Besides, it should be remembered that the opening and closing of flowers are gradual, and that the hours vary much according to circumstances.

A Colossal Tortoise.—*Les Mondes* notes the arrival at Paris of a sea turtle weighing 180 kilogrammes (400 lbs.). The monster was installed in a tank along with the sea lions at the Zoölogical Gardens, but the amphibians, terrified at the presence of the new comer, dared not take their bath, and refused all food. The tank being very deep it became very difficult to catch the turtle, which displayed as much intelligence as vigor in eluding pursuit. It now occupies a shallower tank, where it is attracting great attention from visitors

A leather turtle (*Spargis coriacea*) caught by Samuel Coon, one of the branch pilots of New York, on board the Young Pilot, by way of Sandy Hook, on the 27th of September, 1811, weighed 900 lbs., and measured 7 feet 6 inches in length. This specimen was purchased by John Scudder, proprietor of the American Museum, then at 21 Chatham street. The leather turtle, inhabiting the Atlantic and Mediterranean, is said by naturalists to attain sometimes the weight of twelve hundred to two thousand pounds.

The South American Manatee.—For the second time, a living specimen of that singular animal, the manatee, or sea cow (*Manatus Americanus*), has been brought to England, and may be seen disporting itself in a large glass tank at the Westminster Aquarium. The manatees, or, as they are popularly termed, "sea cows," inhabit estuaries and shallow parts of the shore in the intertropical regions on the Atlantic coasts of South America and Africa. In structure they resemble the dugongs, being placed with them in the order *Sirenia*. The name *Sirenia* is derived from the fact that these animals have a habit of sitting in a semi-erect position in the water, suggesting by their appearance the old travelers' tales of "sirens" and "mermaids," the illusion being heightened by their ability to flex their flippers over the chest, and fold their young in this way (so it is said) to the breast. These animals are said to be related to the whales on the one hand and to the hoofed quadrupeds on the other. They are as truly mammals as are whales, seals, and walruses, having warm blood, breathing by lungs, and bringing forth young alive and suckling them. They have a hairy covering, too, although it is but slightly developed. No outer ears exist, and the eyes are very small. The mouth is a very singular one, having on either side a pad or side lip covered with stiff bristles projecting inward, with which its food (purely vegetable) is seized and conveyed to the mouth. The fore lips, both upper and under, are comparatively small. The teeth are absent from the fore part of the jaws, their place being occupied, as in the upper jaw of a ruminant, by horny pads. The mode of feeding has been compared by Professor Garrod to that of a silkworm or other caterpillar, in which the jaws move horizontally instead of vertically. The respiratory organs are no less remarkable; the nostrils are circular openings with valves, which are closed when the creature is below the surface of the water. The lungs are of unusual size and great length, enabling the animal, after once taking in air at the surface, to remain submerged for a considerable time. As might be inferred from its structure the manatee is purely aquatic in its habits. By drawing off the water from its tank, it was ascertained that the animal is perfectly helpless on land, its only movement being a roll by the aid of its flippers and tail.

The Sparrow Question.—The question as to what shall be done to abate the English sparrow pest is rapidly becoming one of national importance. Our able zoölogist, Dr. Elliott Coues, expresses himself on this subject in very decided terms in the *American Naturalist*. He says the sparrow is a nuisance in a variety of ways; that it does no appreciable good; that it does a very obvious amount of damage; that it harasses, drives off and sometimes destroys useful native birds; that it has no place in the natural economy of this country, and that the complement of our bird fauna is made up without the interloper. There is no room for these birds, and "if there *is* any work for them, time has shown that they slight it, or neglect it altogether. The only way to make these sparrows eat the worms they were imported to destroy, and which they seem specially to dislike, would be to starve them into such unpalatable fare. Instead of this, we sedulously feed them from our tables till they are grown too fat and lazy to think of worms. And if we did not do so, it would be useless to expect them to take to a diet they do not relish, when the streets are full of manure, of which they are specially fond, and the trees of our orchards and lawns are full of fruit and blossoms, and the gardens are full of small fruits, and the fields are waving with grain—all these things being the natural food of birds of the sparrow tribe, to whom an insectivorous diet is only an occasional and temporary variation." These birds have, at present, practically no natural enemies, nor any check whatever upon a limitless increase, a fact that would be undesirable even in the case of desirable birds. Dr. Coues believes that if the limitless multiplication of "these pestilent famine breeders" is allowed to go on unchecked, "we may have, before long, people knocking at the Congressional gates for an appropriation for a Sparrow Commission, like the Grasshopper Commission now sitting, to consider if there be any available relief from the scourge." He believes the numbers might be kept down, if not diminished, without any unnecessary cruelty, by: (1) Letting the birds shift for themselves; turning them loose and putting them on a footing with other birds—that is, taking down the boxes and all other contrivances for sheltering them; stop petting and feeding them; stop supplying them with building materials; let them look out for themselves. (2) Abolish the legal penalties for killing them. Let boys kill them if they wish; or let them be trapped and used as pigeons or glass balls are now used, in shooting matches among sportsmen. Vast numbers of pigeons are destroyed in this way; there are even "sparrow clubs" in various cities, which make a business of practicing on various of our small native birds, for which the European sparrows would be an admirable substitute, answering all the conditions these marksmen could desire. In this way the birds might be even made a source of some little revenue, instead of a burden and pest, as they could be sold by the city to such persons as might desire them for sporting purposes." English papers long ago warned us that the introduction of these sparrows would prove a great mistake, and we are now beginning to find it out.

The Bayberry, or Wax Myrtle.—The *Revue Agricole de Provence* directs the attention of its readers to a shrub, the culture of which, it states, might prove useful in certain conditions of soil and climate. The shrub referred to is no other than our American bayberry, or wax myrtle (*Myrica cerifera*), which, according to our French authority, has the property of improving the air in the neighborhood of marshes, and consequently of rendering a residence near such places less unhealthy. Its fruit is covered with a waxy substance, from which candles may be made that burn with a very agreeable odor. This shrub, says the *Chronique d'Acclimation*, grows naturally in marshy places, on the banks of water courses, and in meadows which are sufficiently irrigated. It is easily propagated from the seeds that it produces in great abundance, as well as from layers.

Bees and their Labor Saving Ideas.—It will be remembered that Mr. Thomas Meehan, a few years ago, covered patches of clover with wire gauze to exclude bees from the flowers and thus prevent cross fertilization, and found that every plant nevertheless perfected its seeds—a result different from that reached by Mr. Darwin. Having been taken to task because he recently referred to the fact that a species of flox (*Linum*) brought from the Rocky Mountains perfects its seeds in his garden and can only use its own pollen, although Mr. Darwin states that "one might as well sprinkle *Linum perenne* with inorganic dust as its own pollen," Mr. Meehan is led to explain his position in *Nature*. He says that nothing is further from his mind than to oppose facts in opposition to Mr. Darwin; his point has been to show that plants or insects do not always behave in the same manner, on all occasions, and under all circumstances. Early last March, while only the three early plants, chickweed, shepherd's purse and *Draba verna*, were in flower, he observed honey bees at work on chickweed exclusively, passing the other two plants by. Now chickweed is one of those plants which has been given up to self-fertilization, and he had never seen bees nor other insects visit it, nor does he know of any one who has. He observed a similar instance last autumn, long after all flowers but *Salvia splendens* had gone. On warm days these flowers were thronged with honey bees, although he is positive these plants were never visited when other flowers were to be had. The corolla tube is too long for the bees, so they had to bore from the outside, which is easy work for large humble bees. Almost all our flowers which offer the least obstruction to mouth entrance are robbed of their sweets in this way. Even red clover is tapped in this manner. But it was very hard work for the honey bees, and Mr. Meehan is sure that but for the absence of other and easier worked flowers he should not yet be able to say that he had seen the honey bee bore from the outside of a flower, as the humble bee usually does. He believes that bees are not attracted to flowers by color or fragrance merely, but that they are influenced rather by labor saving ideas. They are taught by a little experience how to work at any species of flower to the best advantage, and will do it in this manner, of course, till all are done. White varieties or scarlet varieties are all one to them; they distinguish the species by other means than that of color. And they learn, too, where to work with the best prospect of a harvest, and only glean in poor fields after the better ones are reaped. As in the case, too, of their behavior with the chickweed and *Salvia*, they seem to go on the principle that a crust is better than no loaf at all. These considerations will naturally lead to different behavior in different climates of both flowers and insects.

JABORANDI IN BRIGHT'S DISEASE AND ŒDEMA.—In a report from Bellevue Hospital, in the New York *Medical Journal*, it is stated that a woman, aged thirty, entered the hospital suffering from acute nephritis, with general œdema and symptoms of uræmic poisoning. The value of the remedy was very decided. Within three days the dropsy had in great part disappeared. In cases of œdema of the lungs decided benefit resulted from the use of the drug, and a sufficient number of cases were observed to test its value.

New Agricultural Inventions.

Albert Denison, of Stillwater, N. Y., has patented a novel Machine for Sweeping or Removing Vermin or Bugs from Plants, more especially from potato vines, and gathering them into a suitable receptacle from which they can be removed and destroyed at will.

Mr. David A. Smith, of Greencastle, Pa., has patented a combined Cider Mill and Press, in which the improvement consists in the arrangement of a partition disk which separates the cylinder from the rigid gear connected therewith, so as to permit the mill to set in vertical position with the cylinder and ring on horizontal axes. It has an adjustable cheek plate, and a frame or case of novel construction. The means for driving the ring and cylinder are also new.

An improved Churn has been patented by Andrew Beck, of Waverly, Minn. This churning apparatus is simple in construction, convenient, easily operated, and will bring the butter very quickly.

An improved Check Row Attachment for Seed Planters has been patented by Mr. George W. Rogers, of Frankford, Mo. The object of the invention is to provide a more convenient means of operating the dropper slide, and at the same time checking off the ground for succeeding rows of corn.

Mr. Julius A. Platt, of Warren, Ill., is the inventor of an improved Harrow, which is so constructed that the tooth bars may each be free to move up and down independently, while at the same time they are held firmly in their proper relative positions.

Mr. Thomas Muir, of Andes, N. Y., has devised an improved Butter Worker, in which the butter is operated upon by a hand lever on a rotating table, the object being to so improve the construction of the working lever and the supporting table that the grain of the butter will be good and uniform, without tendency to become oily.

Mr. George L. Johnson, of Octagon, Ind., has patented a Derrick for rapidly Loading or Stacking Hay and similar substances; and it consists in a grooved wheel carrying a fork, and mounted on a shaft that is journaled in adjustable standards; and in the combination with the said wheel of a weight to return it after it has been moved in the operation of loading or stacking.

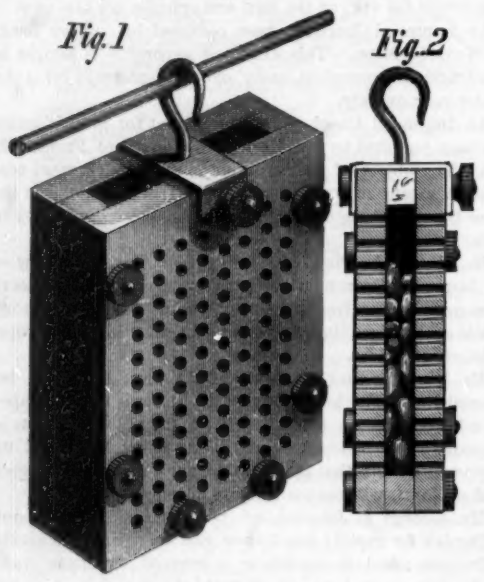
Mr. Jacob Schweickhard, of Kekoskee, Wis., has patented an improved Rotary Churn that represents and combines the advantages of the common plunger and revolving paddle churn, so as to make the butter with the same efficacy as the former, and with the same rapidity as by the latter churn.

Amianthine Coal.

The name amianthine coal has been given to an artificial fuel, invented by M. E. L. J. Rocher, of Toulouse, and especially adapted for heating public conveyances or for use in workshops or laboratories where an open fire without a chimney is required. M. Rocher desired to produce a fuel in the combustion of which the least possible quantity of carbonic acid is disengaged, while a pleasant and healthy odor is evolved. His amianthine coal is of a cheap nature, and, being dense, affords with a small volume a considerable and constant heat, burning freely, but slowly, producing no smoke, and requiring no special apparatus for effecting its combustion. The essential ingredient is green, white, or blue amianthus, or flexible asbestos, which is capable of subdivision into small particles in water, and which, when intimately mixed with other substances, forms a sort of fibrous paste, possessing when dry great elasticity, whereby it is enabled to stand considerable transport without breakage, and the ashes of which after combustion retain the original conglomerate form of the fuel. Moreover, the amianthus fibers in each fuel block, while it is burning, remain unconsumed, and serve to transmit the heat to the surface of the block. As regards the development of carbonic acid, the green amianthus in particular is of great value, being composed of silicate of lime, silicate of magnesia, and protoxide of iron, which by its combustion is further oxidized, as shown by the change of color of the fibers from green to rusty brown, and thus its effect is much the same as that of the pieces of iron sometimes placed in brasiers for neutralizing the carbonic acid. In order further to neutralize the carbonic acid as much as possible, with the amianthus is mixed fat lime, which, when formed into a paste therewith, also acts as agglutinating material, imparting great solidity to the fuel. In place of the lime may be employed other known agglutinating materials, preferably those capable of absorbing carbonic acid. To the above ingredients are added charcoal and acetate of lead, or nitrate of soda or of lime, or substances having analogous properties. Thus, for one description of the fuel, 1,000 parts of charcoal, 100 parts of amianthus, 25 parts of gum, 1,500 parts of water, and 100 parts of acetate of lead are mixed; for another description, 1,000 parts of charcoal, 130 parts of amianthus, 60 parts of lime, 55 parts of nitrate of lime or of soda, and 1,500 parts of water. The above proportions may be modified according to the purposes for which the fuel is to be employed. The charcoal and amianthus are reduced to a fine state of subdivision, and are then mixed together; the nitrate of lime or analogous substance is also pulverized, and then mixed with the other two substances, and to this compound is then added the water in which the agglutinating material, gum or lime has previously been dissolved or suspended. The compound being then stirred so as to incorporate all the ingredients as thoroughly as possible, forms a pliable paste. This paste is placed in moulds to form briquettes or blocks, which are dried either in the open air or in stoves.

WENZEL'S NICKEL ANODE.

The difficulty that attends the operation of making plates of pure nickel for battery anodes has rendered it imperative that something should be devised which would render possible the use of ordinary grain nickel for such a purpose. A very effective little device for containing grain nickel is shown in perspective in Fig. 1, and in section in Fig. 2, in the accompanying engraving. The nickel holder consists of a flat box made of ordinary battery carbon, and having perforated sides, between which the grains of nickel are held loosely, so that the bath solution may come into contact with



WENZEL'S NICKEL ANODE.

the entire surface of each grain. The holder is provided with a hook by which it is suspended from the battery wire. The perforated carbon plates and the strips that separate them are clamped together by rubber bolts, which are provided with milled nuts, so that the holder may be readily taken apart for cleaning, and as the top of the holder is open the grains of nickel may at any time be readily removed for washing. This anode is practically indestructib e. and we are informed by the inventor that its use insures a solid coating of metal and effects a considerable saving in time.

This invention was recently patented by Mr Adolph C. Wenzel, of New York city, from whom further information may be obtained.

A NOVEL ANIMAL TRAP.

The accompanying engraving represents a novel rat trap, which consists of two pails, one suspended over the other by

HOY'S ANIMAL TRAP.

mechanism that is released by the entrance of a rat into the lower pail.

The inventor prefers to use two ordinary pails, such as are in common use for household purposes, as the rats would be more readily deceived by the appearance of on article with which they are familiar; and the efficiency of the trap is enhanced if the pails have previously been used for holding kitchen refuse and retain some of the odor, as rats are accustomed to forage in vessels of that character.

The standard, A, has a circular base piece, B, which is fitted to the pail, C. A second board or disk, D, is hinged to the lower board, and is apertured to admit the standard and also the tripping cord, E. A trigger, F, is pivoted in the upper end of the standard, A, and its shorter arm, which is bent downward, is roughened and engages the roughened end of a pin, H, which projects through the slot in the upper end of the standard and supports the pail, I, by its handle. The bottom of this pail is apertured so that it may slide easily on the standard. The tripping cord, E, is attached to the longer arm of the trigger, F, and extends downward through the aperture in the disk, D, through a staple in the base piece, thence upward through the disk, where it is attached to the bait. A short piece of cord is attached to the cord, E, and also to the disk, D.

Fig. 1 in the engraving shows the trap set, Fig. 2 shows the trap removed from the lower pail. When the trap is set the weight of a rat entering the lower pail depresses the hinged disk, and thus by drawing on the cord, E, moves the trigger, F, so as to release the pin, H, and permit the upper pail to descend and crush the rat in the lower pail. Should the weight of the rat prove insufficient to disengage the trigger, then the pulling at the bait will accomplish it. The upper pail may be weighted or any suitable follower may be substituted for it.

This invention was recently patented by Mr. Albert H. Hoy, of Racine, Wis., from whom further information may be obtained.

Recent Inventions.

Mr. William C. Freeman, of Louisiana, Missouri, has patented an improved Scoop, made of a semi cylindrical bowl of steam bent wood, glued and tacked in a circumferential rabbet on a concavo-convex circular head piece, in which the handle is screwed and glued obliquely above the center in about axial line with the point of the scoop bowl, the latter and the head piece being further secured together by a metal strap on each side, and trimmed to the desired shape.

Mr. Thomas C. Knox, of New York city, has patented an improved Aerated Liquor Apparatus, which is particularly intended for use in connection with fountains, barrels, kegs, or other vessels containing ale, beer, or other aerated or carbonated liquors used as beverages, for the purpose of drawing the liquor for immediate consumption.

Messrs. Dallas M. Killian and Reloy Humbert, of Sioux City, Iowa, have patented a Combined Cradle and Table. It is a table which, by detaching the top, inverting the frame, and applying rockers, may be converted into a child's cradle. When used as a table, the rockers are placed in a cavity in the top; when used as a cradle, the top is detached, the frame inverted, and the legs folded.

Mr. Wade P. Wood, of Leon, Iowa, has patented an Automatic Brake for Wagons and other vehicles, which is so constructed that a rise of the forward end of the tongue, such as occurs in going down hill, will apply the brake to the wheels; a forward pull of the team will move the brake away from the wheels; when not pulling, the brake will resume its normal position; and a backward movement of the wheels (as in backing out) will cause the brake blocks to rise and be released from the wheels.

An improved Shoe has been patented by Leopold Graf, of Newark, N. J This invention relates to the manufacture of shoes, especially those known as "gaiters," and which are buttoned or otherwise fastened on the side. The quarter has its lower front corner cut away to receive an elastic gore piece for the purpose of allowing the shoe to be easily put on the foot.

Mr. William B. Romig, of Lehighton, Pa., has patented an improved Iron Platform for Wagons, which is formed by the combination of the two iron bars with a spring block, and three connecting blocks, a socket plate, and a fifth wheel.

Mr. Dominic Burke, of New York city, has patented an improved Stationary Wash Tub for household and laundry purposes, and it consists in a tub made of hydraulic cement. The object of the invention is to provide a tub that is impervious to water, and will not decay or become leaky.

A NEW CANDLESTICK.

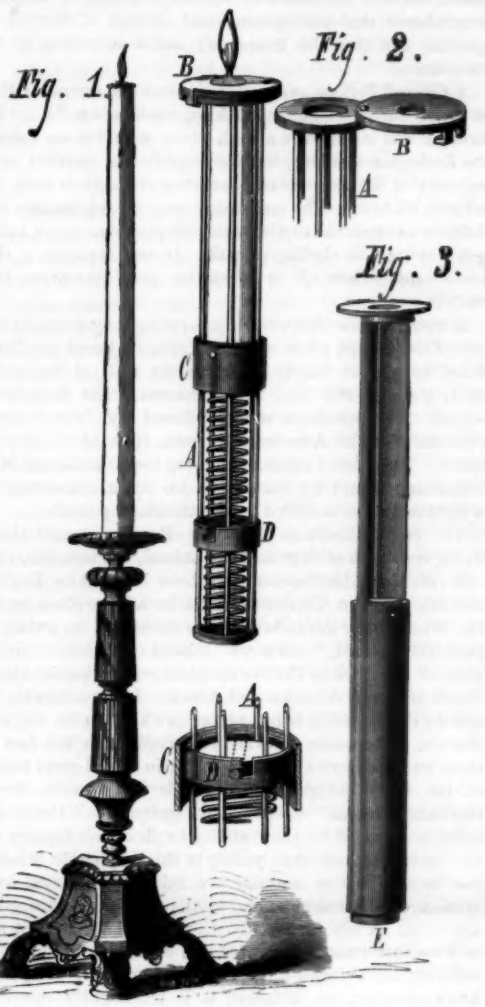
We give herewith several views of an improved form of candlestick, the invention of Mr. Thomas H. Shahan, of 74 Harvard street, Boston, Mass.

This candlestick is made in various forms for different purposes, but the principle is the same in all.

Fig. 1 represents a high altar candlestick, which has the usual external appearance, having a casing for containing the candle, which is made in imitation of a candle of large size.

The details of the interior construction of the candlestick are shown in Fig. 2. The skeleton casing, A, is made of parallel wires secured to head plates, the upper head being apertured, and provided with an apertured pivoted lid plate, B, which has a hook or nib which engages the upper head plate when the candle is in place, and prevents the lifting of the lid plate. The skeleton casing, A, contains a spring acted follower, which is connected with the sleeve, C, by means of a transverse rod, which also serves as a means of holding the spring under compression while the candle is being inserted, the rod being placed in L-shaped notches in a collar, D, attached to the wires of the skeleton frame, and turned. When the follower is thus secured, the candle is placed in the skeleton casing through the aperture in the head, and the lid plate, B, is closed over it. The tip of the candle protrudes through the lid, and as the candle burns the spring follower carries it upward, so that the tip is always in the same position.

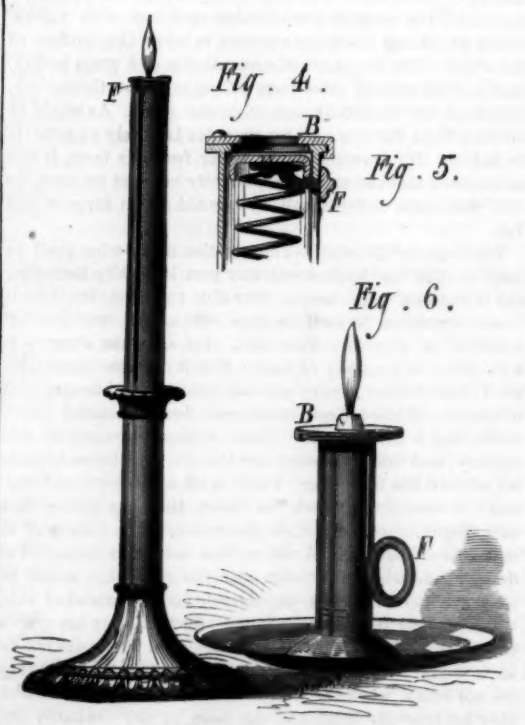
The modified form shown in Fig. 3 is substantially the same in principle as that just described. A long tube, E, is substituted for the skeleton casing, A, and one side of the upper half of the tube is removed to receive the candle. The upper head is apertured for the candle tip, the tube contains



HIGH ALTAR CANDLESTICK.

a spring-acted follower that is connected with a sleeve fitted to the outside of the tube by means of a rod which serves as a fastener, being secured by L-shaped notches, as in the other case.

Figures 4 and 6 exhibit the device as applied to common portable candlesticks, and Fig. 5 represents in detail the arrangement of the spring follower and the pivoted lid piece.



PORTABLE CANDLESTICKS.

In this case the follower is provided with a thumb piece which projects through a slot in the side of the candlestick. The candle is inserted through the apertured upper head, as in the device first described.

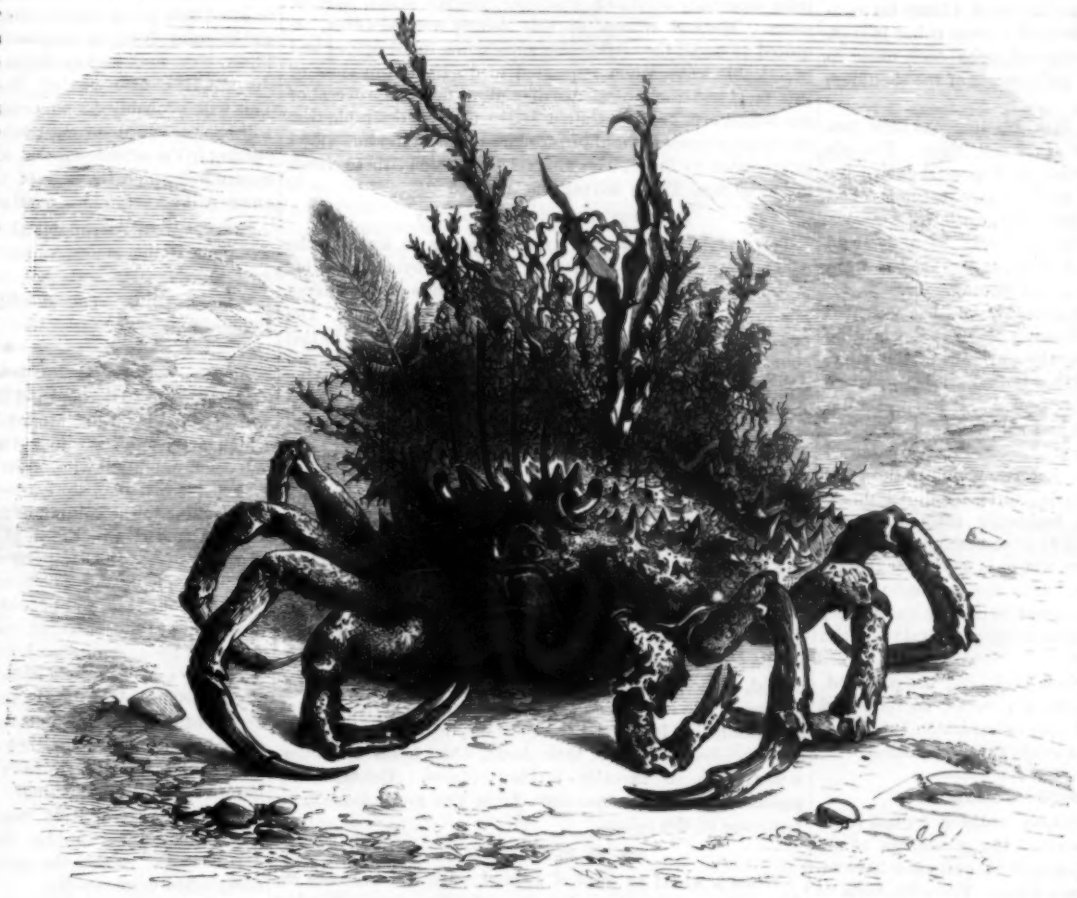
For further particulars address the patentee as above.

THE SPIDER CRAB.

To those who have sailed along our coast to enjoy the sport of "blue fishing," and have whiled away a few spare moments in the contemplation of the various forms of marine life, the object represented in our plate will not prove unfamiliar; and were the animal divested of its ornamentation of sea weeds it would prove no less familiar to those who frequently stroll along the beaches of Coney or Staten Island, or of the Atlantic coast generally, where the empty shell of the dead animal is rather a common object.

This unpromising looking creature is a species of long-legged crab, familiarly (and rather aptly, too) called the "sea spider" or "spider crab," and is of an aspect scarcely less disagreeable than that of the terrestrial spider. In fact the crab, which, like the latter, belongs to the great branch of the animal kingdom, the *Articulates*, occupies a position among crustaceans equivalent to that held by the spider among other articulata. In their youngest stages crabs undergo a true metamorphosis no less striking than that of insects. The young of the crustacea are so wonderfully mimicked by the degraded forms of the young of spiders "that the two forms would seem at a casual glance hardly to belong to different genera, and the two great groups seem to run into each other here, so that their limits are scarcely distinguishable, and we only know that one is a young spider, and the other a young crustacean, by tracing their life history further on." The young in this larval condition were long ago described under the name of *zoëa*, and it is still called the zoëa stage. After casting the skins several times and increasing in size, the young crabs assume the "megalops" stage. Finally, at one casting of the skin the swimming legs disappear, and the little crab comes forth something like the adult form. Most of the species undergo similar changes.

The spider crab (*Libinia canaliculata*) of our Atlantic coast has a somewhat pear-shaped body, and exceedingly long legs, often spreading more than a foot across. Its back is covered with spines and tubercles. The eyes, like those of many of the crustaceans, are borne at the extremity of movable pedicles, and thus they may be turned in every direction without moving the whole body at the same time. Such a provision as this is not necessary in insects, owing to the mobility of the head of these animals; but is absolutely indispensable in the case of crabs, where the head and thorax being consolidated into one mass, the extent of vision commanded by sessile eyes would have been extremely limited, and inadequate to the security of creatures exposed to such innumerable enemies.



THE SPIDER CRAB.—(One half natural size.)

The long legs of this animal remind us somewhat of those of the spider; the two anterior members are armed with slender, feeble claws only, for the animal is neither rapacious nor combative like other crabs. It will be readily seen that its defense can only be a passive one, and it is for this reason (that is, for purposes of concealment) that its shell is usually so luxuriantly adorned. In fact, the spider crab is almost always hidden among stones and seaweeds at the bottom, while other crabs frequent the shore and are continually in search of prey.

We have often fished up these creatures from the ocean and found them covered with mud, barnacles, seaweeds, and other substances which tend to conceal them from their enemies. In some foreign aquaria, where the habits of these crabs have been noted, they have been seen to seize seaweeds and polyps and place them upon their back, having first spread upon them a viscid saliva secreted by their mouth, in order to make them adhere. Seaweeds thus placed seem to grow as luxuriantly afterwards as if they had not been transplanted. Some foreign species, on the contrary, have been observed (in aquaria at least) to be entirely destitute of this artificial covering, and have been seen for hours at a time carefully cleaning themselves with their long claws, and performing the operation with all the grace of a cat. They make use of their delicate claws, which appear so awkward, to carry food to their mouths, and are able, with such imperfect hands, to pick up the minutest morsels.

The habits of this animal were well known to the ancients, and by them this crustacean was made the emblem of wisdom. Its image was suspended to the neck of Diana of Ephesus, as of a being endowed with reason. It figured also on the money of Ephesus as well as on that of several others of the shores of Asia. The ancients also regarded the crab as sensible to the charms of music, an opinion not confirmed by modern experience, and probably an extension of the idea that attributed such a gift to the terrestrial spider.

The spider crab represented in our figure, is a common species of the Atlantic Ocean.

Chances for Enterprising Americans.

Encouraging reports are received constantly of the efforts made by Philadelphia to open up the Mediterranean coast to American trade. A gentleman of commercial prominence in Russia gives as his opinion that when the present warlike cloud has passed away American manufactures will begin to make serious headway in the Russian markets. Another correspondent believes that the Americans might enter into successful competition with the German, French, and English dealers who now control the Italian market, while natives of other countries suggest that much good might result from a distribution over the Continent of catalogues of American goods, printed in the language of the various countries proposed to be covered.

Several large contracts are now open in different parts of the world to which our American capitalists, if they take Time by the forelock, might turn their attention with profit both to themselves, their workmen, and the country at large.

On the Continent the Lisbon and Entrocamento Railway is about to place an order for nearly 20,000 tons of steel rails. The company can be addressed at Lisbon. In Italy two railroad enterprises are under consideration: one for the construction of a line from Airasca to Saluzzo and Coni, and the other from the latter place to Mondovi, both in Piedmont. For information the Italian Minister of Transportation can be addressed.

In Spain the Cortes is considering the desirability of constructing a line from Mollina to Caldas de Mombuy, and the government also proposes to construct a line from Pontevedra to Redondela, to connect with the road from Tuy to Vigo. The national government is being urged also to construct a branch line from Puente de los Fierros to Pola de Lena, and another from Busdonjo to the tunnel of Arbas. In London, also, the Southeastern Railway Company is about to place an order for a number of goods engines and bogie carriages.

Opportunities to bid for contracts are rife in Mexico. A bridge is to be constructed over the river Lerma, as a step toward developing trade between the States of Michoacan and Guanajuato. A railway is to be built between Puebla and Izuoer de Matamoras. A rolling mill for railroad iron is to be started at Morelia, and a paper and cotton mill at San Miguel de Allende. The State Government of Tamaulipas has been authorized to construct a railway and telegraph from Tantoyuquita, or some other point on the Tamesi river, to the city of Valle del Maiz, on the boundary between the States of San Luis Potosi and Tamaulipas.

Other opportunities present themselves in still more distant parts of the world. In Bolivia the Executive has been authorized to construct a railroad from Salintas to Caracoloes. In Yucatan, Central America, another line is to be constructed between Merida and Peto. In Western Australia a light cable is wanted between Freemantle and Rotnest Island, while the Queensland government desires one from the north of Queensland to Singapore. The Messrs. Sieman Brothers, of Germany, have made a bid of $3,500,000 for this latter contract, but the offer has been officially declined. The merchants of New South Wales are also bestirring themselves to obtain a duplicate cable to Europe. Several routes have been suggested, including one from the Northwest Cape to San Francisco. This would cost about ten millions of dollars. Any company which would take the matter up is guaranteed an annual subsidy of $375,000 by the New South Wales Government.—*Philadelphia Record.*

New Inventions.

M. Egidi Moog, of Oggersheim, Bavaria, Germany, is the inventor of an improved Clearing Attachment for Carding Machines, which is designed to be placed in the space between the top cards, doffer, and main cylinder of the machine, for acting on the surface of the cylinder.

Mr. Henry Tibbe, of Washington, Mo., has patented an improved Pipe made of corn cob, in which the interstices are filled with a plastic, self-hardening cement. The stem is connected with the head by being fitted upon a central tube, extending through and secured in the bottom of the pipe head, said tube being provided with a side perforation communicating with the socket of the pipe head.

Mr. Robert Roberts, of St. Joseph, Mo., has patented an improved Cigar Machine for making cigars by first feeding the filling and binder or inside wrapper to suitable moulds and cutting shears, and exposing them to a pressure that reduces the bunch to a size smaller than the proper size. The pressure then eases up, so that the bunch can be fed forward to receive the wrapper, the point being finally finished by hand.

An improved Electric Gravity Escapement for Pendulums has been patented by John F. Pratt, of San Francisco, Cal. The object of this invention is to provide an improved gravity escapement for pendulums of clocks, so as to impart an impulse when near the center of its arc by gravity alone, independent of the force of the electric current, while leaving the pendulum free from all resistance or interference during the remainder of its oscillation.

An improved Machine for Gigging Designs on Cloth has been patented by Max Strakosch, of Brünn, Austria. The invention consists of a vertically adjustable drawing cylinder, over which the cloth is stretched, in connection with a stencil plate of any suitable design, passing in arc shape over the top of the cylinder, and with a revolving and forward-and-backward reciprocating gigging cylinder, that is applied to the cloth when the drawing cylinder is raised by suitable mechanism, so that the gigging cylinder can act upon the portions of the cloth exposed by the stencil plate. The gigging cylinder is taken off the cloth when the drawing cylinder is lowered, and then the latter is turned by intermittingly working mechanism, so as to draw the cloth forward for the length of the stencil plate, and expose the cloth successively to the action of the gigging cylinder.

Susan M. H. Pennington, of Evansville, Ind., is the inventor of an improved Process of Coloring Photographs, which consists in first immersing the photograph in a clearing solution of rosin and paraffin, each previously dissolved in turpentine, and then applying to the face a coat of rosin dissolved in alcohol, and to the back a coat of the clearing solution.

Mr. Edwin C. Haviland, of Sydney, New South Wales, has patented an improved Pencil, which may contain lead of different colors or of different degrees of hardness, any one of which may be brought into use whenever required. It consists in the combination of a pivoted barrel with a holder for the leads, and a stop for retaining the holder in any required position.

Mr. Simson S. Henderson, of North Washington, Ohio, has patented a Device to Receive and Hold a Quid of Tobacco when in the mouth, the use of which will prevent an intemperate use of tobacco, while at the same time affording the chewer the full pleasure, enjoyment, and satisfaction which the use of tobacco imparts.

Mr. Othniel J. Smith, of Wauwatosa, Wis., has patented an improved Whiffletree Hook, by which the trace may be quickly inserted and retained reliably on the hook, and by which the trace is prevented from unhooking itself.

An improved Measuring Pump has been patented by Mr. Tilghman R. Vestal, of Fall River, Mass. This invention relates to an instrument for drawing liquids or gases, either for measuring, bottling, or other purposes, which has the advantage that any desired quantity may be measured off quickly and accurately by the use of one vessel only, without exposing the liquid to dirt and flies, the liquid being finally dropped directly into the receiving receptacle.

Mr. Andrew Zerban, of New York city, has patented an improved Mode of making up Combinations of Colors for Patterns of woven and printed goods, which consists in arranging for selection differently colored samples for observation through the holes of a perforated sheet of the given ground color.

An improved Refrigerator has been patented by Mr. James W. Lawrence, of New York city. The object of this invention is to furnish ice houses for the use of butchers, provision dealers, and others, which shall be so constructed as to produce a colder temperature than is possible to be produced with ice alone, and which at the same time will prevent the ice in the bunker or ice chamber from melting.

Mr. Marcus M. Kendal., of Leavenworth, Ind., is the inventor of an improved Measuring Can and Faucet, by which any desired quantity of liquid may be conveniently and quickly measured off from a receptacle or vessel by merely setting the faucet to its proper place on an indicating dial, the faucet serving also for the purpose of refilling the can when the contents of the same have been measured out.

Messrs. Joseph P. Schmitz and Herbert W. Cooper, of Winona, Minn., have devised an improved Clamp for connecting the lower ends of the parts of a horse collar in such a way that they may have a movement upon each other to accommodate themselves to the movements of the shoulders of the horse in walking.

An improved Fastening for Hat Elastics has been patented by Mr. Moses K. Holt, of Haverhill, Mass. The object of this invention is to furnish an improved device for securing the ends of an elastic cord or tape to ladies' and children's hats and bonnets, to prevent the necessity of sewing the ends of the elastic to the hat every time the said elastic wears out or breaks, and thus prevent the hat from being injured by so much sewing and ripping.

Mr. Samuel R. Bryant, of Waterford, Pa., has patented an improved Apparatus for Cooling Milk, or for heating the same, as may be required for the purposes of the dairy. The apparatus is so constructed that the milk is between two water holders, and is thus rapidly cooled. It has a peculiar arrangement of discharge tubes and valve.

Mr. Levi G. McCauley, of West Chester, Pa., has patented an improved Gas Regulator for Retorts, which is designed for relieving the pressure of gas in retorts, by allowing it to escape more rapidly into the hydraulic main when the pressure increases. The apparatus is connected and coöperates with a steam jet exhauster, which is used for exhausting retorts and forcing the gas into the hydraulic main. When the pressure of gas is too great, it raises a gas holder, and thereby causes a pivoted lever to open the valve of the steam exhauster.

Mr. Julius H. Hollweg, of New York city, has patented, for the use of children and grown persons, an improved three-wheeled velocipede of simple construction, in which the front wheel serves both as a guide and drive wheel.

Ancient and Modern Stimulants.

In a paper read before the British Anthropological Institute, Miss A. W. Buckland described the stimulants of ancient and modern savages, and showed that all races have acquired the use of them in some form. The stimulants of the lower races, such as the Australian, consist merely of leaves and roots, chewed for their strengthening and invigorating properties, this being only a slight advance upon the instinct which prompts the inferior animals to seek out certain plants for medicinal purposes. The first step towards the manufacture of stimulating drinks is seen in the kava of the South Seas. This art of producing fermentation by the masticating process can be traced in a line across the Pacific from Formosa, where rice is the ingredient thus employed, to Peru and Bolivia, where maize is used for the same purpose, the manufacturers being always women. The next advance is that acquired by agricultural races, who make a kind of beer from the chief cereal grown by them. This liquor probably reached Western Europe from Egypt, where it was very early known, through the lake dwellers, and still forms the principal drink of all African races. Pastoral tribes, meanwhile, use the milk of their flocks and herds and the honey of wild bees in the manufacture of their fermented drinks: hence the celebrated *koumiss* and mead of Scythic nations, the same liquors reappearing among the Kaffirs in South Africa, the vessels used in both countries being the skins of animals, which were also used for storing wines in the East. Later, in Greece and Rome mead was a favorite beverage of the Scandinavians and Anglo-Saxons, and there seems to be a shadow of the Scythic *koumiss* in the Devonshire liquor known as white or grout ale, while both liquors may be traced more distinctly in the famous *amrita* and *soma wine* of the Vedas. Various plants and fruits have been used in all civilized and semi-civilized countries from very ancient times in the manufacture of wines; but grape juices had formerly a circumscribed range, having been confined to Western Asia, Egypt, Greece, and Rome, but forbidden in China and the vines extirpated. The religious ceremonies and prohibitions attached to these various beverages were briefly noticed, as also the deification of plants on account of their medicinal properties, and the form and material of drinking vessels; while alcohol, the latest and most pernicious development of the art of manufacturing stimulants, was only mentioned as not having been included among the beverages of the ancients nor known to savages until introduced by Europeans.

Yellow Fever and its Treatment.

The following directions to the medical officers of the Marine Hospital service have just been issued:

OFFICE SURGEON GENERAL,
MARINE HOSPITAL SERVICE,
WASHINGTON, D. C., August 15, 1878.

To Medical Officers of the Marine Hospital Service:

As several of the medical officers of this service have been called upon by the civil authorities to take charge of vessels supposed to be infected with yellow fever and to assume other responsibilities under the National Quarantine act, it is proper to state that the quarantine law was enacted too late for Congress to make an appropriation for carrying it into effect this year, though by personal exertion everything is being done which is possible without the expenditure of money. The strictly executive duties which the act imposes on the surgeon general of the Marine Hospital service have reference to external quarantine to vessels coming to ports of the United States from without. The act expressly provides that this office shall not interfere with or impair any sanitary or quarantine laws or regulations of the States or cities, which may be interpreted to refer especially to land quarantines and the health rules of cities. Medical officers of this service are, however, required to assist the civil health authorities in all proper and practicable ways, when requested to do so, and in view of this fact, and the prevalence of yellow fever in several of the inland cities of the United States, it seems desirable that the surgeon general should make known his individual views in reference to the disease and its prevention—these views not to be regarded as having official force

HOW THE FEVER IS PRODUCED

The weight of scientific evidence seems to warrant the conclusion that yellow fever is produced by an invisible poison, capable of self multiplication outside of the human organism, which it enters through the air passages. The poison germ or miasm is a product of the tropics. In this country yellow fever has prevailed in most of the Gulf and Atlantic cities, and in many of the towns along the Mississippi river. In some instances it has been carried inland with the people fleeing from infected localities, but it has never shown a disposition to spread epidemically at points remote from the continuous water roads of commerce, or to lodge in high salubrious places. The cities of the great lakes have always been free from the disease. Yellow fever cannot be said to be epidemic in the United States, from the fact that in some years it does not appear, though the imported germ undoubtedly survives the mild winters.

It appears to have about as much resistance of cold as the banana plant. When the banana stalk is killed down by the frost the yellow fever does not recur until again imported. The germ is transmissible. It is capable of being transported in the clothing or personal effects of passengers and sailors, but its spread from one city to another is chiefly accomplished by vessels, their damp, filthy holds and bilge water being its favorite lurking places. Confinement, moisture, and high temperature favor the multiplication or virulence of the poison.

USE OF DISINFECTANTS.

When a wharf or spot of ground or house becomes infected the poison at once commences to spread, creeping slowly in all possible directions, continually enlarging the area around the center of infection unless checked by disinfection, as had undoubtedly been done by the use of carbolic acid in New Orleans in former outbursts. Yellow fever is not communicated from the sick to the well, the sick and well being dangerous only as possible carriers of the poison germ or miasm. In support of this assertion it may be stated that at quarantine hospitals, where the effects of yellow fever patients are burned or otherwise thoroughly disinfected before the admission of the patients, the attendants do not contract the disease. This has been demonstrated many times. All well persons whose effects have been disinfected may be considered harmless after six or seven days have elapsed from the time of leaving an infected district or vessel, as the period of incubation of the disease lasts from two to six days. This simplifies the question of quarantine, absolute land quarantines being deemed impracticable, and indicates the direction of preventive measures to the vessel, cargo or the locality, if the poison has found lodgment on shore.

HOW VESSELS MAY ESCAPE.

A vessel may escape infection if kept clean and dry, and all parts capable of being closed are frequently subjected to the fumes of burning sulphur, and the men employed on board are compelled to bathe and change their flannels daily, and not allowed to sleep on deck or in the hold of the vessel. There is an example of a ship trading between Havana and New York upon which these precautions have been enforced for a period of twelve years, and not a single case of yellow fever has occurred on board. Though not sufficiently demonstrated to state as fact, still there seems good reason to believe that much may be accomplished by individual prophylaxis—by the use internally of small doses of sulphate of quinia at regular intervals and of tincture of iron or of chlorate of potassa. As the poison enters the system through the air passages, it has been suggested that the nasal passages be bathed frequently with a solution containing quinine, to be applied by means of a nasal spray.

JOHN M. WOODWORTH,
Surgeon General United States Marine Hospital Service.

ASTRONOMICAL NOTES.

BY BERLIN H. WRIGHT.

PENN YAN, N. Y., Saturday, September 7, 1878.

The following calculations are adapted to the latitude of New York city, and are expressed in true or clock time, being for the date given in the caption when not otherwise stated.

PLANETS.

	H.M.		H.M.
Venus rises	3 41 mo.	Uranus rises	4 26 mo.
Jupiter in meridian	8 52 eve.	Neptune rises	8 36 eve.
Saturn in meridian	1 02 mo.	Neptune in meridian	3 36 mo.

FIRST MAGNITUDE STARS, ETC.

	H.M.		H.M.
Alpheratz in meridian	0 57 mo.	Procyon rises	2 09 mo.
Mira (var.) rises	9 17 eve.	Regulus rises	4 12 mo.
Algol (var.) in meridian	3 55 mo.	Spica sets	7 34 eve.
7 stars (Pleiades) rise	9 03 eve.	Arcturus sets	10 14 eve.
Aldebaran rises	10 22 eve.	Antares sets	9 34 eve.
Capella rises	7 50 eve.	Vega in meridian	7 25 eve.
Rigel rises	0 33 mo.	Altair in meridian	8 37 eve.
Betelgeuse rises	0 18 mo.	Deneb in meridian	9 29 eve.
Sirius rises	2 34 mo.	Fomalhaut in meridian	11 42 eve.

REMARKS.

Regulus and Uranus are still close companions, Uranus being three fourths of a degree south and about one degree east of the star. Venus is nearly "full," 0·91 of her illuminated disk being visible; she is fast approaching Uranus and Regulus, being in conjunction with Regulus September 13, 0h. 30m. mo., and as she is advancing among the stars, she will be a trifle east of Regulus at the time of rising. This will probably be an occultation in England. Saturn will be near the moon September 12, their conjunction occurring in the afternoon, and when first seen in the evening Saturn will be a little west of the moon. Jupiter and the moon will be very close September 7.

ERRATA.—In Astronomical Notes, August 10, "Jupiter will be near the moon August 17," should have read August 11.

"There will be a partial eclipse of the moon August 16," should have read August 12.

New Mechanical Inventions.

Mr. William P. Borland and Herman Hoffmann, of Leavenworth, Kan., is the inventor of an improved Adding Machine, which enables the user to add up a column of figures quickly and accurately, and without it being necessary for him to look at the machine, so that no time is lost in looking from his machine to the column of figures to be added.

Mr. Alfred H. Crockford, of Newark, N. J., is the inventor of an improved Bit Clamp, by which the bits may be centered and firmly clamped. The invention consists of a socket that is open at one side, and provided with an interior recess corresponding to the enlarged end of the bit shank, which is clamped by a centering screw at the upper end of the socket, so as to bear by a conical bottom recess on the conically tapering end of the shank. An angular offset in the handle of the stock prevents the contact of the hand with the clamping and centering screw.

Mr. John J. Crall, of Linn Creek, Mo., has patented an improved Quilting Machine. The object of this invention is to improve the quilting machine for which letters patent have been granted to him, dated August 7, 1877, and numbered 193,852, so that the stitching of the quilts may be accomplished more rapidly.

Mr. Albert H. Carroll, of Baltimore, Md., has patented a Bobbin Supporter for Spooling Machines. This invention is an improvement on patent No. 159,053, in which two loosely suspended arms are employed to embrace the bobbin, and, by pressure on its sides, cause the desired tension and draught on the yarn. The invention consists in applying a weight to the pivoted arms so that they are pressed toward each other and the tension of the yarn increased and made more uniform. The weight is a rectangular plate having slots to receive the pivoted arms, so that the weight slides downward and continually adjusts itself thereon, as the bobbin varies in size.

Steam Colliers.

The Philadelphia *Evening Bulletin* gives a detailed account of the Philadelphia and Reading Railroad Company's fleet of steam colliers, and how their operations are carried on. The fleet now comprises fourteen iron steamers, from 500 to 1,650 tons carrying capacity (only four falling below 1,025 tons), specially constructed for carrying coal. During 1877 they made 526 voyages, running 483,236 miles, and carrying 602,496 tons of coal. From the first, 1869, the fleet has run over 2,000,000 miles, delivering 2,099,036 tons of coal.

Some of these colliers have at times made trips to almos every port along the coast from Portland to Aspinwall, but the greater portion of the trade is with ports between New York and Portland. The average speed of the steamers is about ten miles per hour.

The Pottsville, it will be remembered, made a voyage to Havre last spring to take the exhibits of the Philadelphia and Reading Railroad Company for the Paris Exhibition. She made the run in sixteen days, and her engines were never slowed or stopped during the trip. It was found that as a coal-carrying vessel she was much superior to the English colliers.

THE NEW HARBOR FOR BOULOGNE.

One of the last acts of the French Parliament, before separating for the holidays recently, was to vote nearly $3,500,000 for the construction of a new deep sea harbor for this well known watering place. The chief feature of this harbor—as may be seen in the bird's-eye view which we give in our illustration—is a solid stone jetty, A B C, on the southwest, 2,235 yards long, a wooden jetty, F H, on the northeast, 1,570 yards long, a solid stone breakwater, D E, 545 yards long on the outer or western boundary; between this breakwater and the jetty will be two entrances, C D, 272 yards wide, and E F, 163 yards wide. In the middle of the harbor will be a stone jetty, I K L M, 436 yards long and 218 yards wide, alongside of which steamers may embark and land passengers at all hours of the tide. The new port will have an area of 340 acres, and a depth of water varying from 16 to 26 feet at the lowest spring tides. The letters G H indicate the entrance to the present harbor.

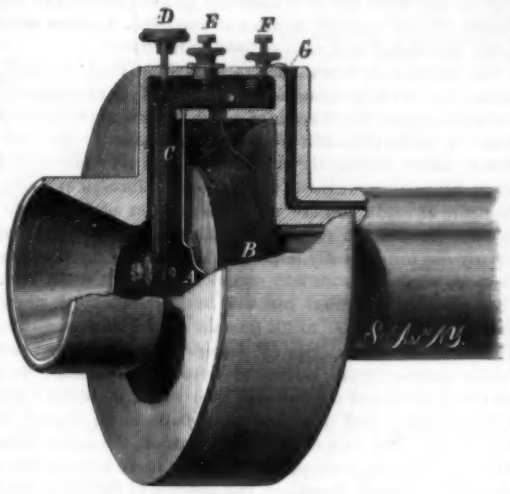
The new port was projected by M. Alex. Adam, former Mayor of Boulogne and ex-President of the General Council of the Pas-de-Calais; during many years it was urged on the government and advocated in the Chamber of Deputies by M. Achille Adam, ex-Deputy, and in the Senate by M. Auguste Huguet, Senator, Mayor of Boulogne. Various plans have been designed by Messrs. Legros, Liddell, Laroche, Vivenot, Ploix, and Stœcklin, under the patronage of the Boulogne Chamber of Commerce, presided over by M. B. Gosselin. The plans eventually adopted are those of M. Stœcklin, Chief Engineer of the Ponts-et-Chaussées. We take our illustration from the London *Graphic*.

Earth Currents.

The action of the currents of electricity that pass round the earth may be conveniently exhibited to a large audience by the following arrangement, devised by Professor W. Le Roy Broun: A rectangular frame of light poplar wood is suspended horizontally by wires attached to the frame of a hydrostatic balance, its longer sides in the magnetic east and west line, and at right angles with the beam of the balance. About the perimeter of the frame are previously wrapped a number of coils of insulated copper wire, each extremity of the wire being made to terminate near the center of one of the shorter sides; it is there passed through the wood, fastened, and cut off about 3 centimeters from the frame. The index of the balance being brought to zero point, the ends of the short terminal wires are immersed in two mercury cups for electrical connection. When the battery current is sent round the rectangle from east to west on the northern side, and from west to east on the southern, the northern side is attracted and the southern is repelled, and the corresponding deflection of the balance renders this plainly visible. When the current is reversed, the deflection is in the opposite direction. By breaking and closing the circuit at proper intervals, to augment the oscillations, Professor Broun easily made the large frame oscillate through an arc of 5°. When the sides of the rectangle were placed N.E. and S.W. the current produced no sensible effect.

NEW TELEPHONE CALL SIGNAL.

The accompanying engraving represents a neat little device for giving telephone alarm signals, invented by Mr. Samuel E. Rusk, of Catskill, N. Y. It is contrived so that



TELEPHONE CALL SIGNAL.

the electric current may be rapidly broken and established by the vibration of a diaphragm, when a sound will be produced in the receiving telephone that will be audible throughout a room of ordinary size.

In the body of the telephone there is a bar magnet, upon the end of which, within the diaphragm, A, a helix, B, is placed. The instrument thus far is identical with the well-known Bell telephone.

In one side of the larger part of the telephone body there is a plate, from which the ears project toward the center of the instrument. Between the ears is pivoted a lever, C, whose shorter arm extends backward under the adjusting screw, F. The longer arm of the lever extends toward the front of the instrument, is bent at a right angle, and extends parallel with the outer face of the diaphragm to the center of the instrument, where it is provided with a platinum pointed screw which passes through the lever at right angles to the diaphragm. The diaphragm is provided with a small platinum disk, which contacts with the screw in the lever when the call signal is in use.

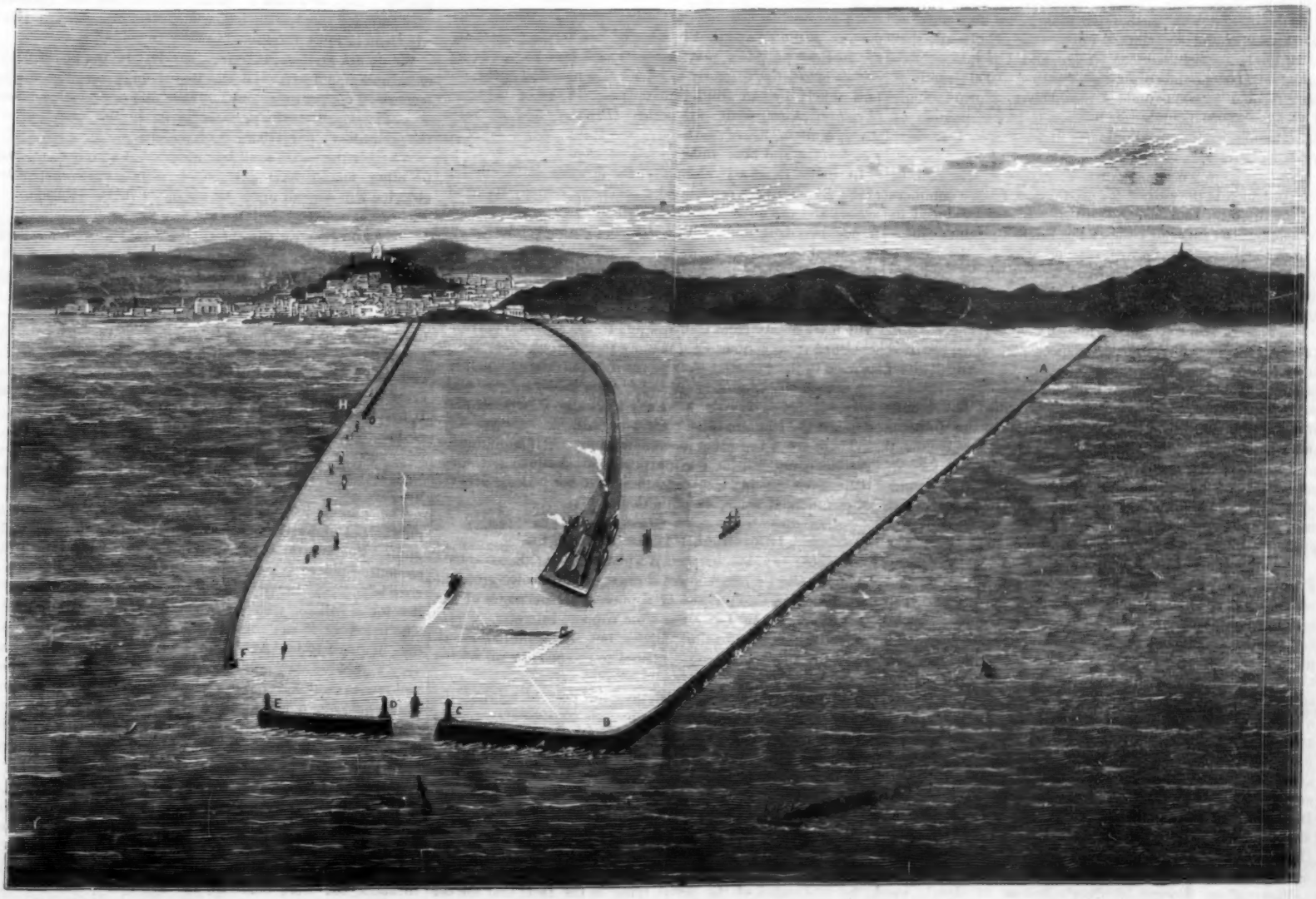
The lever, C, has an insulated knob, D. In the plate there is a vulcanite insulator, through which passes a platinum-pointed screw, E, which, when the alarm is not used, contacts with the lever, C. A milled lock nut is placed upon the screw, E, and binds one terminal of the helix, B, so that it is brought into electrical connection with the screw, E. A spiral spring throws the lever, C, away from the diaphragm and into contact with the screw, E. The diaphragm, A, is in electrical communication with the screw, E, and the plate to which the lever, C, is pivoted is connected by a wire, G, with a binding screw at the smaller end of the telephone case.

When the parts are in their normal position the telephone is used for talking in the usual way; but when it is desired to give a signal the lever, C, is depressed by pressure upon the thumb piece, D, when the shorter arm of the lever is brought into contact with screw, E, and the screw at the center of the diaphragm is brought lightly into contact with the diaphragm, A. The current, which before passed through the wire, G, lever, C, and helix, B, now passes through the wire, G, screw, F, lever, C, diaphragm, A, and the helix, and is broken and established at every vibration of the diaphragm. The current, when thus interrupted, produces in the receiving telephone a loud reed tone, which may be readily heard in every part of a room of ordinary size. After giving the signal the finger may be removed from the thumb-piece, D, and the telephone may be used in talking in the usual way.

American Popular Interest in Science.

In his annual report of the Kew Gardens, for 1877, just published, Sir Joseph Hooker pays a very graceful tribute to American intelligence. Speaking of his visit to this country, he says:

"I cannot adequately express my sense of the liberality with which traveling facilities and hospitalities of all kinds were accorded to me by public companies and private individuals wherever I went in America. The fact of my being connected with this establishment [Kew] was a recognized passport, and this even in the remote settlements of the far West, for I found a reading people everywhere, few of whom had not heard of Kew Gardens. In the Northern States of America the progress of science, and of institutions for the instruction of the people in science, occupy a prominent place in the cheap illustrated periodical literature of the masses; and nowhere on the globe is this literature better or so universally read as in the States. It is hence not wonderful that the progress of such establishments as Kew, the British Museum, South Kensington Museum, etc., should be better known among all classes of the people there than they are in the United Kingdom generally, and so I found it."



THE PROPOSED NEW DEEP-SEA HARBOR AT BOULOGNE

FLOWERS.—THEIR INDUSTRIAL AND MEDICINAL USES.

Of all the parts of plants used in medicine or the industrial arts, the floral organs are those which would appear to be of the very least importance; yet they constitute, in many cases, objects of much greater commercial value than one would naturally suppose. Leaving out of view entirely the immense number of cultivated flowers sold in all our populous cities for ornamental purposes exclusively, there remain a very great number that enter commerce in greater or less quantities for various other and more practical uses. Among such products we may mention, for instance, safflower, saffron, pyrethrum, camomile, roses, violets, and a host of others of less importance.

Safflower (*Carthamus tinctorius*), from the colored petals of which is extracted carthamine, extensively used in dyeing, comes in part from Southern Europe, India, and China. Lyons, France, is the most important consumer of this tinctorial product, using it in great quantities for dyeing silks. The pink saucers of the shops are prepared with a thin coating of carthamine, and from the same product is derived the vegetable rouge of commerce.

Saffron (*Crocus sativus*), although growing in many countries, is cultivated for commercial purposes in the largest quantities in France and Spain. What is known in commerce as "saffron" are the stigmas of the flowers. It takes about 30,000 flowers to produce two pounds of the fresh stigmas, which when dried become reduced to one fifth of that weight. Pereira states that it takes nine flowers to make a grain of saffron, such as found in commerce, and about 4,320 flowers to produce an ounce. It is asserted that in order to obtain one pound of dried saffron, 107,520 flowers are necessary; some authorities even place the number as high as 200,000. Saffron is used in medicine. It is a native of Greece and Asia Minor; large quantities are raised in Egypt, Persia, and Cashmere, whence it is shipped to India. Much of the drug we obtain is imported from Gibraltar, packed in canisters. Parcels are also brought from Triest and other Mediterranean ports. The Spanish product is usually considered the best.

Roses are used both in perfumery and medicine. Extensive rose farms exist at Shiraz, in Persia; at Ghazepore, in India; Adrianople, in Turkey in Europe; Broussa and Uslak, in Turkey in Asia. The cultivators in Turkey are principally the Christian inhabitants of the low countries of the Balkan, between Selimno and Carloya, as far as Philippopolis, in Bulgaria, about 200 miles from Constantinople. In good seasons this district yields 75,000 ounces; but in bad seasons only 20,000 to 30,000 ounces of attar are obtained. Roses are also cultivated to a large extent in England, near Mitcham, in Surrey, to make rose water.

It is estimated that it takes 2,000 roses to yield one drachm of attar, or 3,000 pounds of the petals to obtain one ounce. The species of rose cultivated for its oil or attar is the Provence or hundred-leaved rose (*Rosa centifolia*); the rose principally used in medicine is the French rose (*Rosa gallica*).

Without going into details regarding the cultivation of all the other flowers used in perfumery, we may state, as an evidence of the commercial importance of this art, that one of the large perfumers of Grasse and Paris alone uses annually 80,000 pounds of orange flowers, 60,000 pounds of cassia flowers, 54,000 pounds of rose leaves, 32,000 pounds of violets, 20,000 pounds of tuberoses, 16,000 pounds of lilacs, besides an enormous quantity of the fragrant portions of other plants.

Lavender is grown to an enormous extent at Mitcham, in Surrey, which is the seat of its production, from a commercial standpoint. Immense quantities are also produced in France, but the superior odor of the English product causes it to realize in market four times the price of the French article. The flowers are the parts used, both in medicine and perfumery. Half a hundredweight of good flowers yield by distillation from 14 to 16 ounces of essential oil.

The flowers of the common American elder (*Sambucus canadensis*) and the allied European species (*S. nigra*) are used in medicine and perfumery, for the latter use being distilled to form elder flower water.

The cloves of commerce are the unexpanded flower buds of the *Caryophyllus aromaticus*, a tree a native of the Moluccas and other islands in the China seas. The average annual crop of cloves from each tree is, according to Burnett, 2 or 2½ pounds; but a fine tree has been known to yield 125 pounds of this spice in a single season; and as 5,000 buds only weigh one pound, there must have been at least 625,000 flowers upon this single tree.

Several species of pyrethrum are cultivated in Europe (as *P. roseum* and *P. carneum*) for the sake of their flowers, which when powdered come into commerce under the name of "Persian insect powder." That which comes from the Caucasus is considered the best. The valuable insecticide properties of this powder have rendered it a highly important article of commerce. Over 500 tons are annually consumed in Russia alone.

The camomile (*Anthemis nobilis*) is a native of Europe, and grows wild in all the temperate parts of the Continent; it is largely cultivated for the sake of its flowers, which are extensively used in medicine under the name of Roman camomiles. These, as found in our shops, are imported from England and Germany. From the latter country are also exported, in considerable quantities, what are known as German camomiles (*Matricaria camomilla*), which are principally used by our German population.

The yellow flowers of dyer's broom or dyer's weed (*Genista tinctoria*) are used for dyeing yellow. Both these and the seeds have been used in medicine. The plant grows wild in Europe, and is sometimes cultivated in this country.

In the East the petals of the *Hibiscus rosasinensis* are used as a dye; upon being bruised they turn either black or purple, the black being so intense as to be used for blacking boots; hence the plant is sometimes called the shoeblack plant. The flowers are likewise used for coloring liquors, and are very often employed by women as a hair dye.

The flowers of other genera of the mallow tribe, such as *Malva sylvestris*, *M. rotundifolia*, *Althæa officinalis*, and *A. ficifolia*, are made use of in medicine as demulcents; and the flowers of still another member of the tribe, *Abutilon esculentus*, are cooked and used as food in Brazil.

The number of flowers that are used as food is small; among these we may mention the artichoke (*Cynara scolymus*), the undeveloped flower heads of which furnish a much prized dish. A thistle (*Gondelia Tournefortii*), similar to the artichoke, occurs abundantly in Palestine, and its undeveloped flower heads are brought to the markets of Jerusalem under the name of cardi, and are much sought after as a vegetable. In many parts of India the flowers of a sapotaceous tree (*Bassia latifolia*) form a really important article of food. The blossoms are very numerous and succulent, and are eaten raw. They are also sun dried and sold in the bazaars. A single tree affords from 200 to 400 pounds of the flowers. The flowers of another species (*B. longifolia*) are employed in a similar manner by the natives of Mysore and Malabar; they are either dried and roasted and then eaten, or bruised and boiled to a jelly and made into small balls to be traded for other food. The unopened flower buds of the caper bush (*Capparis spinosa*), a creeping plant of Southern Europe, when pickled in vinegar constitute the condiment known in commerce as capers. It was known to the ancient Greeks, and the renowned Phryne, at the first period of her residence in Athens, was a dealer in capers. The flower buds of *Zygophyllum fabago*, a native of the Cape of Good Hope, are used instead of capers, or substituted for them. Long pepper (*Chavica roxburghii*), which in chemical compositions and qualities resembles black pepper, and is used for the same purposes, consists of the immature spikes of flowers gathered and dried in the sun.

Koosso, highly valued in Abyssinia as a vermifuge, and used more or less in Europe and America for the same purpose, consists of the flowers of *Brayera anthelmintica*, a tree about 20 feet high belonging to the family of Rosaceæ, growing on the table land of Abyssinia at an elevation of six or seven thousand feet above the sea. Wormseed, or *semen contra*, also extensively used as an anthelmintic, consists of the small unexpanded flowers of a plant (*Artemisia Judaica*, or *A. glomerata*) growing in Palestine and Arabia. From these are extracted the active principle *santonine* of the drug shops. The well-known household remedy, arnica, consists of the flowers of a composite plant, *Arnica montana*, indigenous to the mountainous districts of Europe and Siberia. This remedy is in such universal use as to make it an article of considerable commercial importance. Among other flowers, gathered and sold in more or less varying quantities for medical purposes, may be mentioned the *Marigold* (*Calendula officinalis*), formerly in repute as a remedial agent, but now chiefly used to adulterate saffron; European centaury (*Erythræa centaurium*), red poppy (*Papaver Rhœas*), rosemary, mullein, lily of the valley, clove pink, dogwood (*Cornus florida*), and blue violet (*Viola cucullata*).

In Switzerland and Germany, the flowers of the linden (*Tilia Europæa*) are considered a sovereign remedy for headaches; and the flowers of this, or allied species, are also sold in our own drug stores. In Cairo the extremely odoriferous flowers of *Santolina fragrantissima*, called by the native name Babourug or Zeysoum, are sold extensively for the same uses as camomile.

The peculiar fragrance of the finer and more costly teas which we obtain from China is due to the artificial perfume obtained from contact with many odoriferous flowers, largely used in the Celestial Empire for that purpose. The flowers principally employed are the Chulan (*Chloranthus inconspicuus*), *Aglaia odorata*, the Cape jessamine (*Gardenia florida*), and the fragrant olive (*Olea fragrans*).

There are a few other flowers used by the inhabitants of various countries, for one purpose and another; but since their use is entirely local, and they have not become articles of commercial value, we omit them.

THE CHLORINATION OF COPPER.

A noted instance of special legislation was the establishment, twelve or fourteen years since, of practically prohibitory duties on foreign ores of copper, with the result of the salvation of the Lake Superior copper interests, whose mines produced metallic copper, but the annihilation, almost, of all those interests related to the production of the metal from the mineral ores.

At the time of this legislation the cost of mining the metal from the Lake Superior ores was considerably greater than was that for its production from the sulphurets, but for successful and profitable working of these last a mixture of carbonates of copper was requisite; and these were obtained only from Africa and the west coast of South America.

The treatment of the Lake Superior ores is a very simple matter, only stamping and washing to liberate the metal from the matrix being required to prepare it for the melting and refining furnaces, the reasons for the higher cost in the production of the metal lying in the facts that the ore contains, generally, but a small percentage of copper (consequently for a ton of copper a good deal of ore has to be mined), and that the mining is a slow and difficult matter. The treatment of the sulphurets, on the other hand, involved several roasting and melting processes and the use of the carbonates and of fluxes of various kinds as preliminaries to the refining process; but the ores worked contained copper largely in excess of those of Lake Superior. It will be seen that the chief investment of capital in the one case is for the mining plant, and, in the other, for the furnace or reducing plant. In the one case the expense is large and constantly increasing, in the other confined to repairs.

Doubtless the great falling off in the demand for this metal which was consequent upon the conditions obtaining shortly after the close of the war, and simultaneous with the adverse legislation spoken of, had, more than anything else, to do with the quiet submission of the copper manufacturers to this change of tariff.

When these old companies were floating on the full tide of pecuniary success, several new processes for reducing sulphurets without the aid of the carbonates were presented to them, but rejected without thorough investigation, either because their working would involve almost entire change of costly plant, or that the control of the market, which they held, converted them into conservative opponents of all innovations, and when the tide suddenly ebbed they became sadly indifferent to all progress.

But now, as in year after year new and rich mines of sulphurets have been discovered, until we can boast of more abundant and valuable deposits than are found in any other country, we cannot understand why these interests have not sought out some process which will make them independent of tariffs and enable them to compete successfully with the Lake Superior operators.

In the chlorination of gold and silver ores containing copper—which plan is daily becoming more approved—we find indication of the true method for our copper sulphurets. The chlorination of the copper in these ores precedes that of the more precious metals, and it is readily precipitated from the solution and melted and refined for use as a precipitant of the gold and silver; but as its production in such cases is only a collateral or secondary matter, no safe estimates of the cost of the operation can be made.

Nevertheless, chlorination is to our mind the process which is destined to give proper value to our mines of sulphurets. We have given much thought to the matter, and have informed ourselves of the various ways practiced or proposed for effecting the chlorination and recovering the metal. The roasting with salt in reverberatory furnaces; the plain roasting and subsequent treatment with chlorine gas; the oxidation, in a powdered condition, in a downward column of flame and instant plunging in a bath of alkaline chlorides; the proposed chlorination by dropping the powdered ore and salt together, through a heated upright furnace, on a dry hearth—these and other plans have received our attention; and while some crudities, some lack of completeness may be found in each of them, we are satisfied that patience and intelligence would soon discover and remedy them in most instances.

We do not hesitate, therefore, to advocate the principle of chlorination, nor to recommend its thorough investigation to owners of copper mines, nor to state that the greatest economy, the closest working, seems to lie in the direction of the preliminary pulverization of the ores.

Whether the metal shall be precipitated with iron or lime or other matter having stronger affinity than copper for chlorine will depend upon the character of the solution.

Testing the "Captive" Balloon.

THE commission appointed by the French Government to test the rope used by M. Giffard in the construction of his captive balloon have made their experiments. The rope is conical, the heaviest end being uppermost, so that if any breakage should take place it will not be very near to the car, but close to the earth. The resistance of the smaller end has been found equal to a tension of 24,000 kilos. exerted by hydraulic pressure, and is smaller than anticipated. It had been suggested by Mr. Newall to employ a wire rope of his own make, which would have had a much greater resistance with a smaller weight; but the suggestion was lost, M. Giffard fearing some electric discharge might ignite the gas.

The commission has given its authorization to admit the public, but under the condition that the pressure should be limited to a quarter of the breaking strain—8,000 kilos. The ascending power is generally about 12,000 lbs. The difference left to bear the pressure of the wind will be about 5,000 lbs. for a balloon whose surface is 4 x 1,170 square yards. The breaking of the rope answers to a resistance of 50,000 lbs., or about 10 lbs. per square foot of a plane; it can bear very high wind, and need fear only a tempest. Some observations have already been made by M. Tissandier, but in a somewhat rough manner. An anemometer will be constructed in the car, and its readings will be compared with the readings at the steelyard, to which the rope is attached.

AT the close of the year 1877 there were 716 blast furnaces in the United States which were either blowing or in a condition to blow. Of these, 270 were in blast, and 446 out. On the 1st of July, 1878, six months later, of 708 furnaces reporting, 248 were in blast, and 460 were idle. Of the idle furnaces, 202 were charcoal, 130 anthracite, and 128 bituminous; of those blowing, 64 were charcoal, 95 anthracite, and 89 bituminous.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

NEW BOOKS AND PUBLICATIONS.

GEMS OF AMERICAN SCENERY. The White Mountains. New York: Harroun & Bierstadt. Price $3.

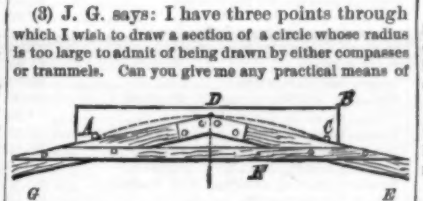
This attractive little book marks a new departure in bookmaking, and one which cannot fail to commend itself to many. Its illustrations are stereoscopic views printed in permanent black by the Albertype process, a flap of the cover carrying the lens required for seeing the views stereoscopically. Thus we have in one compact volume a stereoscope (which may be used also with detached views), two dozen unfading views of the more striking bits of White Mountain scenery, and a series of brief descriptions of the scenes displayed. The novel idea has been carried out so successfully that it is quite safe to predict the speedy as well as wide and useful application of the plan to other than scenic illustration. In mechanical and scientific works, for example, especially those intended for the young, stereoscopic illustrations, showing the objects with actinic accuracy and solid, cannot but be exceedingly advantageous. Such illustrations would be as much superior to the carbon-printed photographs now coming into use, as the latter are superior to the old-fashioned woodcuts and lithographs.

Notes & Queries

(1) C. O. B. asks: 1. Can a short line of telegraph be run by burying plates of copper and zinc in the ground, and if so, how would I proceed? A. Yes; but a number of plates would be required, and they would have to be buried in earth that is constantly moist. It would be better to use two or three gravity cells. 2. What would perpetual motion be? Must it be independent of the power of magnetism and gravitation? A. Perpetual motion is believed to be an impossibility. Permanent magnets and gravitation are the mainstays of seekers for perpetual motion. 3. Was there ever a wheel or other piece of mechanism made to run by permanent magnets and gravitation? A. No. 4. Could not a few very large cells be used for producing the electric light, since the larger the cells the greater the quantity of electricity, hence the more heating power? A. Yes, but medium sized cells are generally used. 5. Would not ground wires sunken at different places around a building, and connections made to flues, spouts, and other ironwork of the house, be a good protection against lightning? A. Yes, if the wires were attached to large plates or bunches of metal scrap buried in moist earth. 6. Would a soft iron wire connecting both ends of a Speight permanent magnet tend to retain its magnetism? A. Yes, but heavy armatures would be better.

(2) "Lowell" asks how to remove India ink from the flesh. A. The particles of carbon must be cut out.

(3) J. G. says: I have three points through which I wish to draw a section of a circle whose radius is too large to admit of being drawn by either compasses or trammels. Can you give me any practical means of



accomplishing this object? A. Suppose that A D C are the points through which the arc of circle requires to be drawn. Take two strips of wood, E D and G D, of which one edge must be planed true. Place them so that their planed edges lie even with the three points, as shown in the cut, beveling them off at the ends where they meet (at D). Then fasten the ends together by nailing a piece across the joint at D, and nail on a brace, F. Drive a nail in the points, A C. A pencil held against the strips (at any point), while the frame is moved laterally and against the nails at C D, will describe the arc required, as shown by the dotted lines.

(4) J. W. B. asks: What composition is used in casting stereotype plates? A. Lead, 60; antimony, 15·5; bismuth, 15·5.

(5) J. E. J. asks: 1. Will small holes in the coating of a Leyden jar cause an escape of electricity? A. No. 2. Will a cracked Leyden jar contain electricity? A. If the crack is in that portion of the jar that is covered with tinfoil the electric fluid will probably pass from one coating of the jar to the other.

Some time ago I made a paper tube from a long, narrow strip of newspaper, turned down the large end, and near it cut a hole. I then lit the small end, but instead of lighting the gas which came out at the hole, I turned it into a bottle, intending to experiment with it afterwards; when I took up the bottle some time after I found that the gas had resolved itself into a heavy, viscid, amber colored liquid, with that peculiar odor observable where there has been a conflagration. The gas was not absorbed by any moisture in the bottle, for it (the bottle) had been standing near the fire all day. What kind of gas is it, or what is the viscid substance? A. When woody or vegetable fiber is subjected to destructive distillation the products, besides illuminating gas, are chiefly water, pyroligneous acid (wood vinegar), creosote, wood spirit (methylic alcohol), and, as the temperature rises, various hydrocarbons, as paraffin. The character of the product depends upon the nature of the fiber distilled and the temperature employed.

(6) A. H. P. L. asks: What is used to stick tinfoil to a jar, in making a Leyden jar? A. Use alcoholic shellac varnish, of the consistency of molasses.

(7) J. E. T. writes: Having found Dr. Lionel Beales' and all other injections for microscopic specimens containing Prussian blue to fade, it has occurred to me to experiment with the aniline violet or blue. Will you kindly direct me to a book on this subject? I want a permanent blue or violet, or at least some way to make these colors fast. Do you know of a good book on the aniline colors, how to make them, to use them, and especially to prevent the blue or violet from fading? A. In common with other aniline colors the aniline blues and violets are not permanent dyes, though the blues are among the most permanent of this class of dyes. For dyeing animal tissues blue the color (soluble or Nicholson blue) may be dissolved in hot water rendered slightly alkaline with borax, and the full tint developed and fixed upon the dyed substance by means of dilute sulphuric acid. The violets require no mordants and are much less permanent than the blues; the fading cannot be avoided. Tissues may be stained a good violet by the following solution: Extract hematoxylin, 4 drachms; alum and potassium sulphate, 2 drachms; water, 2 fluid ozs.; mix, filter, and dilute with ten or twelve volumes of water or glycerin. Fresh tissues require more time than those which have been hardened in alcohol or chromic acid. You may consult Reiman's "Aniline and its Derivatives," Calvert's "Coal Tar Colors," and Schutzenberg's "Traite de Materiel Colorante."

(8) J. M. asks whether a diamond can be burned. A. Heated to whiteness the diamond burns readily in oxygen; also in air, but more slowly.

(9) T. H. asks what to use in making aniline black ink that will give it a beautiful gloss. A. Try a concentrated solution of borax 1 part, and shellac 4 parts, in boiling water.

How can I make the liquid plating used for polishing silver? By slightly rubbing on silver it gives it a splendid polish. The liquid you mention is doubtless the "magic silver plating fluid" we have so often referred to in these columns—an aqueous solution of mercuric chloride (corrosive sublimate) and nitrate. The luster of the film of quicksilver amalgam formed when it is applied to the metallic surfaces is fictitious, and soon disappears. The preparation is very poisonous, and several cases of mercurial poisoning have resulted from its use on spoons and similar articles.

(10) F. D. can make a good mucilage as follows: Dissolve 2 ozs. of dextrin in 6 ozs. of hot water, and add 1 oz. or more of acetic acid.

(11) G. P. S. asks how ginger ale extract is made. A. (1) Bruised ginger, 3½ oz.; boil for half an hour in 1 quart of water, replacing the water lost by evaporation. Strain the extract, evaporate it four fifths, and add sugar, 1 lb.; cream of tartar, ¼ oz.; lemon juice, 1 fluid oz. For use dissolve in one gallon of water. (2) Boil 1½ lb. of bruised ginger in 3 gallons of water, strain and concentrate as before, and add sugar 20 lbs.; lemon juice, 1 pint; honey, 1 lb.; sufficient for 18 gallons. (3) Powdered sugar, 2 drachms; powdered ginger, 15 grains; bicarbonate of soda, 26 grains. Mix, and wrap in a blue paper. Tartaric acid, 30 grains; wrap in a white paper. For use dissolve each in half a glass of water, and mix.

How can I make carbonic acid gas by the bicarbonate process? A. Mix together 14 parts of bicarbonate of soda, and 15 parts of tartaric acid; both perfectly dry and powdered; on contact with water this powder evolves carbonic acid briskly.

(12) M. N. asks how to make a good, cheap furniture polish. A. Pale shellac, 3 lbs.; mastic, 6 ozs.; alcohol of 90 per cent, 3 quarts. Digest together in the cold in a well stoppered vessel, and occasionally agitate until solution is effected.

(13) H. W. M. asks why exploring expeditions are not sent to the South Pole. A. The South Pole is more inaccessible than the North Pole. It is now in the glacial stage.

(14) H. S. D. asks how to make a cheap, practical acoustic telephone which will operate over two miles of wire. A. You will find description of a good acoustic telephone on p. 75 of current volume in answer to No. 28, but it cannot be recommended for the distance named. A telephone of the Bell form would do much better.

(15) A. H. L. asks: 1. Is gas carbon expanded by the passage of an electric current? A. We think not to a perceptible degree. 2. If not, how is the receiving diaphragm vibrated in Edison's telephone? A. Edison's receiver is substantially the same as the Bell telephone. 3. What are the material and the thickness and size of the sounding board in the microphone? A. We do not know that dimensions have been given. 4. Would ferrotype plate work if the current were prevented from crossing it? A. No.

(16) S. K. O. asks: What can I waterproof a canvas tent with? A. Saturate the material with a strong hot aqueous solution of soap, and after a short time with hot solution of alum or aluminum sulphate.

What will drive away or destroy mould in a cellar? A. Lime whitewash.

(17) G. E. D. asks: What is the composition and weight of the dime, three cent, five cent, and one cent pieces? A. Dime: silver 900, copper 100; weight, 2·5 grammes; five cent pieces: copper 75, nickel 25; weight, 77·16 grains; three cent piece has the same composition as the five; weight, 30 grains; one cent piece, copper 95, tin 3, zinc 2; weight, 48 grains.

Can coke be used as a substitute for carbon plates in the galvanic battery? A. See pp. 196 (2), and 203 (2), vol. 37, SCIENTIFIC AMERICAN.

(18) R. P. G. asks for the process of bluing watch and clock springs, screw heads, etc. A. A very regular temperature is required for bluing steel. The articles must be polished, and buried in wood ashes heated to about 550° until desired color is obtained.

(19) J. A. G. asks: 1. Can electricity be produced in sufficient quantity from an ordinary battery to produce any light with charcoal points? If so, how best prepare battery? A. You may get a very small light from ten cells of Grenet battery. 2. Can anything but glass jars be used for battery? A. Coat wooden boxes with the following mixture, melted: 2 parts of wax, 10 parts of common rosin, 2 parts of red lead, and ½ part of gypsum. 3. What size wire is best to connect telephones without magnets? A. A thread is better than a wire for an acoustic telephone. If wire is used it should be No. 36.

(20) A. B. C. asks: 1. What is the trouble with my telephone? I use a magnet 5½ x ¾. The diaphragm, 2¼ inches, is made of tin-type, with the collodion scraped off. The helix is made of ¾ oz. of copper wire No. 40, silk insulated and covered with shellac varnish. It is placed on the south pole of the magnet, and is wound right handed. The line wire is about 30 yards long. It is iron, not galvanized, No. 17. The ground connection is made by filling a hole with zinc and tin scraps, and several feet of wire are placed on it, and then one half a peck of salt. The wire in the ground is not the same size as my line wire. A. The trouble probably lies in your ground connections. For the distance named a return wire, we think, would answer better than the ground. 2. How near will I have to put my diaphragm from the magnet? I put it about the thickness of cardboard. I have failed to get any sound from it. A. The magnets are properly adjusted.

(21) L. F. K. writes: In a recent issue of the SCIENTIFIC AMERICAN I saw directions for making an acoustic telephone. I made one, but before beginning work on it doubted whether the sealing wax would hold the plate against a taut line, and the event proved me to be correct. I then placed a gum ring between the plate and wood, and secured the plate to the wood with a few brads, and the apparatus worked more satisfactorily than a Bell telephone, with which I had experimented. I wanted to put up "my own make," but the difficulty is that about 20 feet of the line at each end is exposed to the air, and this arrangement cannot be altered. Any twine that I can use will not last more than a few weeks. Can you suggest any preparation of the twine that will enable one to use it, say, for a few months? A. To secure the diaphragm to the wood a good quality of sealing wax may be used successfully by heating the diaphragm and applying a little of the sealing wax near its periphery. Shellac 4 parts, pitch 2 parts, Venice turpentine 1 part, melted together, make a good cement for this purpose. Twine may be rendered more durable by boiling it first in a strong soap solution and then in strong solution of alum.

(22) J. A. B. asks: What is the best and most economical way of extracting the grease and oil contained in the scrapings, trimmings, etc., of leather? It contains about 50 per cent of tallow and oil, and in some cases more. A. You may digest the waste for several hours with enough carbon disulphide to cover it, pressing out the excess of liquid on removal; repeat with more waste, and when the solvent becomes nearly saturated draw it off, and subject the solution to distillation in a hot water or steam bath—the solvent being recovered by a suitable condenser, and the oil and fatty matters remaining in the still.

(23) A correspondent suggests that railway engineers be provided with telephones, so that in case of accident they might be connected with the telegraph wires and thus establish a communication with the stations.

(24) L. T. S. writes: I send by mail a piece of stone containing a fine yellow dust. What is it? A. The rock very probably contains nothing of value; the glimmering particles are mica.

Can you tell me how to make a small exhaust blower large enough to take sawdust from a circular saw table and dust from an emery wheel of small size? A. For blower see reply to C. M. B. (27) in No. 5 of current volume. Connect your exhaust pipes with the center of the fan casing. The fan should make from 1,900 to 1,500 revolutions per minute.

(25) H. P. asks for a recipe for an indelible ink to use on a linen stamp. A. See p. 27 (31) current volume, and p. 107 (37).

(26) E. P. asks how to use an acid that produces a frosted appearance upon glass. The name I know the acid by is "white acid." A. The acid you refer to is hydrofluoric acid—produced by heating powdered fluorspar and strong sulphuric acid together in a platinum or leaden retort, and absorbing the gaseous product in cold water contained in a bottle of gutta percha. Warm the glass, cover it with a uniform film of wax or paraffin, through which to the surface of the glass the design is afterward etched with a steel point, then expose the surface to the acid or acid gas.

Can you tell me how to make photographs transparent, and then varnish them, or by any other means render them capable of being exposed to air and light without opaque spots appearing? A. Allow the photograph to remain in water until thoroughly soaked, then place it between blotting paper and let it remain until just damp enough to be pliable. Then coat the face of the picture with good starch paste and lay, face down, on the glass. Commence in the center of the picture, and rub outward toward the edges to dispel all air and excess of paste, care being observed not to get paste on the back of the print. While rubbing keep the paper damp with a sponge. When dry lay on a heavy coat of castor oil, and after a time rub off the excess of oil with a cloth. After standing a day or two it may be colored. Cover the back with a thin plate of glass, and bind the edges

(27) G. G. C. asks how rubber printing type are made? I know how to make rubber stamps, but do not know how they make solid rubber type. How do they make the single letters? A. The prepared rubber is moulded by pressure while warm, using steatite powder on the moulds, and vulcanized as described on p. 22, SCIENTIFIC AMERICAN, current volume.

(28) F. R. A. writes: I wish to make etchings on zinc plates, that is, I wish to make a drawing on zinc with some ink that will resist sulphuric or muriatic acid so I can obtain a relief plate. What are the ingredients of such an ink? A. Genuine asphaltum, 1 part; oil of turpentine, 4 parts; dissolve and add lampblack to bring it to the proper consistence.

(29) C. B. H. writes: A cement used for cementing leather indicates by its smell that sulphide of carbon is the solvent used. How can I ascertain whether it is the di- or bi-sulphide? A. The bisulphide and disulphide are the same. 2. How can I test the cement for oil of turpentine? A. Expose a quantity of the solution in a shallow vessel over the water bath to a temperature of 110° Fah. for some time. If turpentine oil is present it can be recognized by its odor in the residue from which the more volatile sulphide has been expelled. Carbon disulphide boils at 110° Fah., turpentine oil at 310° Fah.

(30) S. F. B. asks for a recipe for a paste or mucilage for a scrap book. Ordinary mucilage is too hard and stiff after it is dry. A. Rice starch, 1 oz.; gelatin, 3 drachms; water, ½ pint; heat with constant stirring until the milky liquid becomes thick and glassy, and the paste is ready. Keep the paste in a tight bottle with a few drops of clove oil.

(31) W. B. H. asks: Will you please inform me how I can expand the rubber cylinders so as to place them on the shafts of clothes wringers? The iron shafts are first wound in their whole length with heavy twine or cord, forming the core of the shaft, over which the rubber cylinder is to be placed. The bore of the rubber cylinder is much smaller than the iron shaft before it is wound. What I wish to know is, how this thick stubborn rubber cylinder is expanded so as to be placed over the cord wound core or shaft. A. Rubber rollers are expanded by means of a conical piece of brass which is fitted to the end of the roller shaft. The large end of the brass core must of course be larger than the larger part of the shaft. The cement which is applied to the inside of the roller and to the shaft acts as a lubricant.

(32) H. B.—The total eclipse of 1869 took place on the 7th day of August.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated·

S. B.—The bituminous substance closely resembles grahamite—an inspissated and oxygenated petroleum. Am. J. Sci. II., xiii. 430, 1866.—A. W. C.—Mica (muscovite) is usually cut in about 100 numbers, the sheets varying in size from 2 x 2 to about 8 x 12 inches, and the prices (for clear and perfect sheets) from 50 cents to $6 per hundred sheets.—E. H. P.—Hematite of fair quality. An assay would be requisite to determine its precise value.

HINTS TO CORRESPONDENTS.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Many of our correspondents make inquiries which cannot properly be answered in these columns. Such inquiries, if signed by initials only, are liable to be cast into the waste basket.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure the receipt of original papers and contributions on the following subjects:

Light as a Motive Power. By F. E. G. M.
Variable Velocity. By J. T. O.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

June 25, 1878,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

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Designs, apparatus for copying.—T. Hall, Boston, Mass.
Forges.—Munsell and Thompson Manuf. Co, N. Y. city.
Ice machinery.—T. Cook, Philadelphia, Pa.
Illuminating apparatus.—J. W. De Castro, N. Y. city.
India rubber boots and shoes.—National Rubber Co., Bristol, R. I.
Lamps.—R. Hitchcock, Watertown, N. Y.
Medical compound.—L. J. Dart, Albion, Cal.
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Spinning machinery.—J. C. Stanley, New Hartford, Ct.
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Tacking apparatus for boots.—F. C. Hinds, Quincy, Mass.